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GEORGIAN BAY CANAL

REPORTS

CURRIE MANN CONSULTING ENGINEERS

AND

KIVAS TULLY CIVIL ENGINEERS

APPENDIX [illegible] AND [illegible]

[illegible]

THE

GEORGIAN BAY CANAL.

REPORTS

OF

COL. E. B. MASON, CONSULTING ENGINEER,

AND

RIVAS TULLY, CHIEF ENGINEER,

WITH

APPENDIX PROFILE AND MAP

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1858.

REPORT

To GEORGE ETZEL, THOMAS RICHMOND, *and* WILLIAM BIRGE
Commissioners of Toronto Connection, Act of Sept. 10th, 1853

GENTLEMEN.—In compliance with your request, I visited Canada in the fall of 1856, and examined the proposed route of the Toronto and Georgian Bay Canal, in company with MYERS TULLY Esq., of Toronto, who had then just commenced his survey

In the exami inations made at that time, several routes presented apparent facilities for construction nearly equal, and in view of the great importance of the project, it was deemed essential to make a more extended survey of the country than was at first contemplated

Mr Tully has since devoted much time in a careful and thorough examination of them differs in routes, and the results he presents in his able report published herewith.

Mr Tully has so fully discussed all the points relative to the construction of the canal, that I beg to refer to his report for information on that head.

I propose to present in this report,

First—The distance by lake canal and river between Chicago and New York, and Chicago and Quebec, by each existing and contemplated route

Second—Cost of transportation by each route in vessels of different sizes.

Third—Cost of the canal, tonnage and revenue, with the prospective increase from year to year

Fourth—Extent of country tributary to the canal channel, agriculture and mineral resources, extent of country now under cultivation, present needs for railway progress etc.

Fifth—Construction

1st. *The Distance by Lake, Canal and River.*—The following table of distances has been made up from the most reliable information I could obtain by the exhaustion of charts and by consulting navigators now resident in Chicago. It will be found to vary from the table prepared by Mr Tully or from computer barometre made. The variation is mainly between Chicago and Buffalo, which has heretofore been computed at 1 100 miles. This distance, no doubt, has been made up from the nearest distances, which has been the route taken generally by vessels heretofore.

But it is believed that a vessel starting from Chicago, and taking the most direct route through the lakes, would not necessarily have to go more than 916 in lat to reach Buffalo.

Wherever the St. Lawrence river forms a portion of the route, it has been saluted under the head of lake, as being a navigation not materially more expensive than the lake.

The length of the canals on the routes to New York includes the distance to Albany and to the actual length as all cases except by the Toronto and Georgian Bay route.

The whole distance in this case from Lake Huron to Lake Ontario, 180 miles is called canal, whereas 32 miles of it through Lake Simcoe, and from 12 to 20 miles of what is called canal is open navigation, having a large area width, really reducing the distance of actual canal to about 40 miles

This explanation is due to the Toronto and Georgian Bay route although in making up all the cost of transportation it was deemed advisable to call the entire length a canal.

Comparative Distances of the existing and proposed Routes from Chicago to New York.

ROUTE.	Lakes.	Can.	River.	Totals.
Chicago via Buffalo to New York	916	464	145	1525
" " Welland Canal and Oswego to N. York	916	327	146	1389
" " Georgian Bay Canal and Oswego to New York.	905	379	40	1324
" " Welland Canal and Lake Champlain to New York	1 196	187	146	1529
" " Georgian Bay Canal and Lake Champlain to New York.	1 01	260	146	1397
" " Ottawa Canal and Lake Champlain to New York.	998	211	145	1354

Cost of Transporting and Insuring Grain from Chicago to Quebec

Route.	Length in miles.	Rental in dollars.	Time in days.	Rate in dollars per bushel.				Total.
				Lake.	Canal.	River.	Insurance.	
Chicago via Welland Canal and St. Lawrence to Quebec	1,800	1,000	30	1	2	1	1	5
" Georgian Bay Canal and St. Lawrence to Quebec	1,800	1,000	30	1	2	1	1	5
Ottawa Canal and St. Lawrence to Quebec	1,800	1,000	30	1	2	1	1	5

8d. *Cost of Transportation.*—In making out these tables it has been assumed that there would be no transhipment of the grain from Chicago but that the Fort and Georges Canals would be large enough to fit the dimensions now proposed for the Erie Canal, and that on all the other routes such a grain vessel would be made as to enable the same vessel loading at Chicago to deliver her cargo in New York or Quebec and on the ocean where no transhipment occurs the price by rivers is computed the same as by lakes.

This difference in the cost of transportation in small and large vessels is only intended to be approximate, the actual result would no doubt be still more favorable for handling large vessels.

FROM CHICAGO TO NEW YORK.

ROUTE.	Length in miles.	Rental in dollars.	Time in days.	RATE IN DOLLARS PER BUSHEL.				Total.
				Lake.	Canal.	River.	Insurance.	
1000 ton vessel, Buffalo to Erie Canal	900	400	40	1	2	1	1	5
500 " " " "	900	400	40	1	2	1	1	5
300 " " " "	900	300	40	1	2	1	1	5
1000 " Georgian Bay Canal	800	400	40	1	2	1	1	5
1000 " Ottawa Canal	1000	400	40	1	2	1	1	5
1000 ton vessel, Welland Canal to Oswego	1000	400	40	1	2	1	1	5
500 " " " "	1000	300	40	1	2	1	1	5
300 " " " "	1000	300	40	1	2	1	1	5
1000 " " " "	1000	400	40	1	2	1	1	5
500 " " " "	1000	300	40	1	2	1	1	5
300 " " " "	1000	300	40	1	2	1	1	5
1000 ton vessel, Buffalo to Erie Canal, Oswego	1000	400	40	1	2	1	1	5
500 " " " "	1000	300	40	1	2	1	1	5
300 " " " "	1000	300	40	1	2	1	1	5
1000 " Georgian Bay Canal, Oswego	1000	400	40	1	2	1	1	5
500 " " " "	1000	300	40	1	2	1	1	5
300 " " " "	1000	300	40	1	2	1	1	5
1000 " Ottawa Canal, Oswego	1000	400	40	1	2	1	1	5
500 " " " "	1000	300	40	1	2	1	1	5
300 " " " "	1000	300	40	1	2	1	1	5

FROM CHICAGO TO NEW YORK.

ROUTE	Lake in Canals.	Canals.	RATE IN MILLS PER MILE.			Total.
			Lake.	Canal.	Other.	
800 ten vessels Welland Canal and Lake Champlain	1360	147	1·5	3	3	$3·53
100 " " "	1036	11	1·45	2·1	3	1 13
400 " " "	1136	11	1·45	2·1	3	1 18
100 " " "	1329	07	1·45	2·1	3	1 31
1000 " " "	1329	107	1·45	2·1	3	3 31
300 ten vessels Georgian Bay Canal and Lake Champlain	761	389	1·1	2	3	2 53
400 " " "	1011	389	1·1	2·1	3	3 72
600 " " "	1111	389	1·1	2·1	3	4 07
700 " " "	1111	389	1·1	2·1	3	4 61
1000 " " "	1111	389	1·1	2·1	3	5 88
1200 ten vessels Ottawa, Canal and Lake Champlain	806	333	1·6	3	3	3 64
400 " " "	1056	11	1·45	2·1	3	1 18
600 " " "	1056	11	1·45	2·1	3	1 31
1000 " " "	1011	1011	1·45	2·1	3	4 60
1600 " " "	1011	1011	1·45	2·1	3	5 60

CHICAGO TO QUEBEC.

ROUTE	Lake in Canals.	Canals.	RATE IN MILLS PER MILE.			Total.
			Lake.	Canal.	Other.	
200 ten vessels by Welland Canal,	1004	68	1	2	3	$1 81
400 " " "	1004	68	1	1·1	3	1 60
600 " " "	1393	68	0·5	1	3	1 66
800 " " "	974	68	0·5	1	3	1 90
1600 " " "	1406	70	0·5	1	3	3 11
200 ten vessels by Ste's Bay Canal	1065	11	1	2	3	1 66
400 " " "	1091	141	0·5	2	3	1 60
800 " " "	1091	141	0·5	2	3	1 73
140 " " "	1065	81	0·5	2	3	1 46
1000 " " "	1065	41	1	2	3	2 25
100 ten vessels by Ottawa Canal	871	208	1	2	3	4 81
1 00 " " "	976	208	0·5	2	3	1 88
200 " " "	976	208	0·5	2	3	1 04
140 " " "	976	208	0·5	2	3	0 90
1000 " " "	976	208	0·5	2	3	3 30

CHICAGO TO LIVERPOOL.
In 1000 Ton Vessels.

Chicago or Buffalo to New York	$0 87	
New York to Liverpool, 3,365 miles at 2½ mills	4 47	
		$5 34
Chicago or Welland Canal and Oswego to New York	$4 94	
To Liverpool	2 42	
		7 36
Chicago or Georgian Bay Canal and Oswego to New York	$4 87	
To Liverpool	2 42	
		7 29
Chicago or Welland Canal and Lake Champlain to New York	$4 96	
To Liverpool	2 59	
		7 55
Chicago or Georgian Bay Canal and Lake Champlain to New York,	$4 78	
To Liverpool	2 42	
		7 20
Chicago or Ottawa Canal to New York	$4 68	
To Liverpool	2 37	
		7 05
Chicago or Welland Canal to Quebec	$3 20	
To Liverpool, 1,300 miles at 2½ mills	3 25	
		6 45
Chicago or Georgian Bay Canal to Quebec	$3 24	
To Liverpool	3 23	
		6 47
Chicago or Ottawa Canal to Quebec	$4 56	
To Liverpool	3 23	
		7 80

3d. Cost of the Canal, Tonnage and Revenue.—Of all the routes surveyed by Mr Tully Route No 1 presents the most favorable features and is the one that is recommended. The route commences at the mouth of the Kinebec river and passes through Lake Simcoe terminating at the mouth of the Nottawasaga river on Lake Huron. I entirely concur with Mr Tully in his views of these terminal points. By references to the profile, it will be seen that the ascent from Lake Ontario to the summit is quite an even and gradual, consisting of a series of combined locks as shown on the profile, or in some cases of single locks with sufficient space between them for passing vessels.

The combined plan gives larger reaches between the locks and has some advantages in that respect for towing vessels. But these advantages are more than counterbalanced by the delay that must necessarily occur by such an arrangement of locks unless they are double locks, particularly when the canal is worked up to near its full capacity

Whatever it was practicable therefore, I should advise the single lock, with sufficient space between for the convenient passing of vessels or what combined, that they should be constructed with a view to adding a double lock at a future day. No work of a difficult character presents itself until we reach the summit level where we encounter a cut of nearly 200 feet at the deepest point, averaging about 80 feet for nearly two miles. This is probably a larger and more extensive cut than has ever before been encountered on any public work, but the examinations so far as made, do not show any thing unsurmountable in its execution. Such allowance has been made in the estimate for contingencies as seemed necessary from all the information that has been obtained. It would be desirable, however as this is the only serious obstacle, to have a more thorough examination made at this point with a view to ascertain with more certainty the quality of material to be encountered in making the cut.

The navigation through Lake Simcoe is favorable, with a sufficient depth of water for safety.

The cut between Lake Simcoe and the Nottawasaga river averages about 10 feet for several miles here there is nothing that indicates anything unfavorable or very formidable. From its entrance into the Nottawasaga Valley to the western terminal point it is caused ugly favorable, except a short cut near the lake. The worst part of this distance was d be a very considerable extra width of water surface, affording a fine navigation. The Nottawasaga river for some four miles from its entrance into the lake runs nearly parallel w ith the lake and w from 80 to 600 feet wide, w ith an average depth from 9 to 12 feet water, and at a very small expense may be made a perfectly safe harbor for a very large number of vessels.

Mr Tully's estimate for the route described is	$28,170,000
Six per cent. interest on this sum would be per year	1 690,200
For regular and ordinary repairs of the canal say $1000 per mile or per year	100,000
	$1,830 200

In order to pay 6 per cent. on its cost and maintain it, we require an income of $1 830,200 ; will the country ordinarily to it afford a business that will justify this expense for its accommodation ? My opinion to what has been done in former years we may draw conclusions for the future.

In Messrs. Parkinson and Smith's report on the St. Clair Chatham and Rond Eau Ship Canal, they estimate the total tonnage passing St. Clair flats in 1865, between the ports of Chicago Milwaukee, Toledo, Cleveland, Buffalo Oswego, and Ogdensburg, at 2,833,316 tons. Taking into account the smaller ports on the east it will be safe to call the tonnage in 1865 3,250,000. I am confirmed in my opinion that is a moderate not over estimated, by consulting the very able report of Col. J. D. Graham, U S Army on the commerce of the lakes, and various other authorities

In the very valuable reports of John B. Jervis, Esq on the Cayuga and Seneca Canal, and of William J McAlpine Esq., in 1862, that State Engineers of New York, I find that Mr Jervis estimates that the tonnage from 1855 would be doubled in six years and quadrupled in fifteen years, and that the total movement to and from lake water in 1765, from and to ground west of Buffalo would be 9 808,800 tons. Mr. McAlpine estimates the movement on the Erie Canal in 1862 at a little more than 3,000 000 tons allowing the same rate of increase as estimated by Mr Jarvis would very soon work the canal up to its full capacity in the opinion of both.

Assuming then the tonnage that passed the St. Clair flats in 1865 to have been 2 950,000 and allowing one third of this amount for the business between the ports and Lake Erie and points north and west of the St. Clair flats, we have left 1 916,667 tons as the amount that would probably have passed through the Georgian Bay Canal had it been completed in 1865 I assume as the rate of increase the rate cent. for 6 or 8 years. The reasons for this are particularly set forth as maximum part of this report. And assuming the tolls on the canal to be four mills per ton per mile, in forty cents per ton, we have the following result

Year	Total Tonnage.	The amount of tonnage that would pass the Canal.	Tolls.
1865	2,950,000	1,916,667	
1871	3,540,000	2,300,000	
1880	5,252,480	3,126,000	
1885	6,303,840	3,751,200	$ 1,125,360
1890	7,564,608	4,501,440	1,350,432
1895	9,077,529	5,401,728	1,620,518
1900	10,893,035	6,482,074	1,944,622
1905	13,071,642	7,778,489	2,333,546
1910	15,685,970	9,334,187	2,800,256
1915	18,823,164	11,201,024	3,360,307
1920	22,587,797	13,441,229	4,032,368
1925	27,105,356	16,129,475	4,838,842
1930	32,526,427	19,355,370	5,806,611
1935	39,031,712	23,226,444	6,967,933
1940	46,838,054	27,871,733	8,361,519
1945	56,205,665	33,446,080	10,033,824
1950	67,446,798	40,135,296	12,040,588

The canal, if commenced soon and prosecuted with the energy it should be, may be in successful operation in 1896. We commence then with a business nearly equal to six per cent. on its cost, with a certain prospect of a rapid increase.

The lumber trade I have not considered in my estimate of the tonnage. The letter marked "A," see Appendix, from W. R. A. Hoyt Esq., of Paisley, Canada, will give an idea of what may be expected from that source.

EXTENT OF COUNTRY TRIBUTARY TO THE CANAL.

In this as in other portions of this report, it is unnecessary to go far before finding that any good map of North America. It will be seen that the great central valley of the continent, lying between the Alleghany and the Rocky Mountains stretches from the Gulf of Mexico to the Arctic Ocean. This magnificent valley—for there is no chain of mountains east and west to divide it—is drained to the north by the Mississippi, to the east, by the St. Lawrence to the Atlantic, and by the Severn, Nelson's, and other rivers, into Hudson's Bay, and to the north by Mackenzie's river, which empties into the Arctic Ocean. The great commercial streams of commerce have always followed the lines of longitude, and it needs no argument to show that the trade of the central portions of this vast valley—the largest and the richest upon the globe—must flow east and west through the lakes and the Valley of the St. Lawrence. The north and south traffic upon the Mississippi and its tributaries will ever be large and important, but as compared with commerce upon the lakes and rivers and through the River canal and the St. Lawrence to the ocean, the trade upon the Mississippi must ever fall far below both in bulk and value, that upon the lakes and the St. Lawrence.

It will be conceded at once that the Georgian Bay Canal will be a competitor for the trade of the eastward of all the country east of the Rocky Mountains, and west and north-west of the southern point of Lake Michigan. By the Illinois Central Railroad wheat is brought from the southern counties of that state to the Chicago Market, and it will be certainly safe to say that the

lake route will extend the route as far south as the latitude of Akron. Drawing a line therefore east and west through Akron, and extending it to the Rocky Mountains, we shall have within the bounds of the United States west of the Rocky Mountains and west of Lake Michigan, 60,000 square miles of territory capable to form fourteen states as large as Ohio. There is much more territory than this, but it is intended only to embrace that which is valuable and available for settlement and profitable cultivation. The report of H. L. Hind, Esq. Naturalist and Geologist of the recent Canada exploration to the Red River of the North, gives the amount of territory available and valuable for settlement, north of the boundary of the United States, and drained by the rivers flowing into Lake Winnipeg at 400,000 square miles. It is safe to say therefore, that the commerce of 1,000,000 square miles of the great central valley of the American continent, would be tributary to the Georgian Bay Canal. It has been stated by men whose judgment is worthy of respect at 2,000,000 of square miles but we prefer to be far within rather than beyond the true estimate. This vast territory is equal to one-third of the entire area of the United States, and, Russia excepted is nearly equal to that of all Europe combined

COMMERCIAL FACILITIES.

To illustrate this topic by particulars would require a much larger space than the limits of this report will permit. The magnificent chain of lakes extending west far away towards the centre of the continent, and affords as nearly all the advantages of ocean navigation, as a most wonderful provision of Providence to promote the commercial and hence the moral, welfare of the millions who are soon to inhabit the valley So gentle are the slopes that the large rivers which drain it, into the Gulf of Mexico and Hudson's Bay the Mississippi and its tributaries and the rivers flowing into and including Lake Winnipeg are navigable for steamers for thousands of miles No country in the world presents a finer field for railway enterprise, and as fields up with a vigorous, industrious, intelligent population, these advantages will be fully appreciated and improved.

CLIMATE.

The climate of that portion of the territory in the United States that would be tributary to the Georgian Bay Canal, belongs to the most healthy and invigorating portions of the temperate zone. It is the range which, in all ages of the past has nourished the most populous and powerful empires, and that such is the "manifest destiny" of the country under consideration all who have studied its character and resources have entire confidence. Of the 400,000 miles of territory in the valleys of the Red River of the North, the Assiniboin, the Saskatchewan and surrounding Lake Winnipeg record investigations have shown that its climate is well adapted to promote the health and the vigorous development of the human family. Mr Hind, whose report is referred to above, says that "all the necessaries of life are found in the Red river valley. All crops cultivated in Canada succeed well, and often show an average yield far in excess of Canadian returns. The climate of the agricultural zones is well adapted to all the operations of husbandry. Corresponding observations show that the summer temperature is three or four degrees warmer than at Toronto." The winter climate, he adds, "is very severe." Though severe, all experience has proved that the winter is bracing, and not unhealthy to the ordinary outdoor operations of that season in northern latitudes. The recent large and elaborate work of Prof. Blodgett on climatology has proved that the climatic lines, when they pass west of Lake Superior, bend far away to the north: and the abundant meteorological proof is in his well sustained opinion that the climate of the region under consideration is highly favorable to the development of a great, prosperous and powerful people.

AGRICULTURAL RESOURCES.

In agricultural resources it is conceded by all who understand the subject that no portion of the globe, of equal extent, contains so rich a soil, or so many elements of all that can contribute to

the physical comfort and the moral elevation of man. All the cereals are produced in great abundance; fruits of all kinds common in corresponding latitudes are matured in the greatest perfection; and horses, mules, cattle, sheep, swine, poultry, and all the domestic animals, are produced in the greatest abundance. If fully developed, there can be no question whatever that the soil of this last region would support a population as dense as that of any other portion of the globe, and afford the means for the highest physical, intellectual and social development. Should we speak by parochiales, and give figures and estimates, from well-known facts, as to its productive capacity, they would appear more like the extravagant musings of a vagrant imagination than the deductions of sober matter-of-fact reality.

MINERAL RESOURCES.

COPPER. — Both in extent and richness the copper mines of Lake Superior are without a rival. The annual figures showing the rise of masses of native copper found in the Minnesota, the Cliff, and some of the other mines appear absolutely fabulous. There are hundreds of square miles in the south shore of Lake Superior whose strata are filled with copper, and an abundance of this metal is found there to supply the world for ages to come.

IRON. — The reputation of the Lake Superior iron as among the very best on the world is now generally established. Mountains of this essential element of civilization exist there, sufficient alone to supply the entire continent for an indefinite period in the future. Iron also is found in Illinois, Wisconsin, Iowa and Minnesota, in which districts in great abundance. Hints are not wanting to prove its existence in that part of the British possessions under consideration, and in some portions it is believed that it will be found in large quantities

COAL. — Illinois contains one of the largest and we long it must become one of the most productive coal fields in the world. It also extends into Iowa and exists there in large quantities. In relation to the northern portion of the territory under consideration in the United States, and that which is embraced in the

British possessions the following facts are quoted from an able and most valuable lecture on The Undeveloped North and Portion of the American Continent," delivered before McCormick Collage, Chicago February 1888 by Joseph Schafer, Ph.D. editor of the Chicago Daily Times. The lecturer (page 1) says:

"I passed by the same place upon the existence of coal in a large portion of the country. Assiniboia and New Saskatchewan south of its entrenching at different places on the Saskatchewan. Lewis and Clark saw bituminous coal between Fort Clark and the falls of the Missouri River. Catlin has also met coal in the same locality. Wonderful new seen specimens of the Yellowstone. Her Majesty party found that valuable country from the falls of the Missouri eastward to the mountains, nearly five hundred miles, underlaid with lignite. Successful species of explosion among the mountains near the head waters of the Missouri, which showed a workable coal. In fact, coal has been traced along the 49th parallel of latitude for a distance of nearly two degrees of longitude with a southern outcrop, continuing it more than probable, when considered in connection with the discovery of coal in the Saskatchewan, the Assiniboine, Nathanael's River and Green Bay Lake that a coal field of greater extent than any other in the North American continent is the eastern half of the district of country included in our subject. Further evidence is found to support this hypothesis in the discoveries of coal mainly all around the southern rim of the North American continent by the expedition of whaling vessels, and by the hardy explorers who have invaded the Arctic seas in search of a north-west passage. In the great sea of both cold and ice in Greenland, upon Baffin Island and upon the Parry Islands, off the coast of Greenland—thus indicating the wonderful economy of nature, a point the adolescence is beneficent Providential design, by which regions destitute of timber are supplied with an easily accessible fuel."

Iowa.—The extent and the resources of the Gallant land illustrations already very generally known. As in the magnificent of her lakes and a rich, as in the bestowment of her mineral treasures in this vast country. Kansas has flourished with a most bountiful hand. There is here enough and to spare of this valuable mineral, for all the people that can ever find a home upon the American continent.

In summing up the mineral resources of the northern portion of the American continent, Mr Harper, in his lecture above quoted, says:

"The most extensive systems of oil springs and also showed a low region, in different localities, both within the American and the British Possessions, and by more districts the mineral itself in found in great profusion and abundance.

Considering the vast amount of minerals already discovered with scarcely any scientific exploration, the hypothesis is by no means unreasonable one, that properties of the continent conceals this vast undeveloped metal-wealth in unknown resources."

EXTENT OF TERRITORY NOW UNDER CULTIVATION

It is impossible to estimate with any certain approach to accuracy the amount of this vast region that is now actually under cultivation. The rapidity of the growth of the North West has so far exceeded all former rates of increase that one scarcely dares to believe the figures when the census returns show the acknowledged results from any decade to another. In 1860 the amount of land in that portion of the United States now under consideration, which was then under cultivation, as shown by the census returns, was as follows

Illinois	5,099,848
Wisconsin	1,055,499
Iowa	939,888
Minnesota	8,765
Total	8,314,761

This is an area of 13,004 square miles, only about one-fifth of the area of the State of Illinois. Since 1860 we have no returns to show the amount of land brought under cultivation, but the statistics of population, as will hereafter appear show an increase of 63 per cent. in five years, from 1860 to 1865 in the states above named and the increase for the same period in those states and Indiana, Ohio and Michigan, show a gain of 59 per cent. With the ratio of 59 per cent. there would be 3,920,741 acres under cultivation in 1865 and at the close of 1867 9,954,765 acres, equal to 15 534 square miles.

PRESENT POPULATION

And its probable increase and also that of the lands brought under cultivation, Commerce, etc.

The population of the district in the United States, now under consideration in 1850, 60, 67, as derived from the government and state census, and other sources, was about as follows

	1830.	1845.	1857
Illinois	157,479	1 100,256	1,000,000
Wisconsin	300,301	581,189	700,000
Iowa	192,213	345,000	500,000
Minnesota	6,077	40,000	200,000
Pokrahie,		6,000	30,000
	1 656, 07	2,211 941	3,779,000

These figures, as above stated, show an increase from 1830 to 1857, of some 68 per cent. but if the States of Ohio, Indiana and Michigan be added to the above, as they are commonly included in speaking of the North-west, the ratio is brought down to 28 per cent. which we prefer to take as a basis for future calculations. Taking these figures as the mean for thirty-seven years, which is a fraction more than the average lifetime of a generation, we present the following table shewing the probable increase of population and the amount of lands to be brought under cultivation for every five years, from 1858 to 1892:

From the very valuable report of Col. J. D. Graham, U. S. Army on the commerce of the lake ports for 1855, we find that the total value of the commerce of Chicago and Milwaukee which passed over the St. Clair Flats for that year was $134,304,687 72. Adding only the value of the commerce of Milwaukee for that of all the other ports on lake Michigan, we shall ha e $159,109,150,56 as the total value of the commerce from lake Michigan which passed over the St. Clair Flats in 1855.

The following Table shows the Present Population, amount of Land now under Cultivation, Commerce of Lake Michigan which would be tributary to the Georgian Bay Canal, or for which it would be a competitor Estimated Revenue, with the Tonnage and Cost of Freight on Vessels which passed over the St. Clair Flats in 1885, with their Probable Increase for thirty-seven years, at the rate of 20 per cent. for every five years—20 per cent. being the Ratio of the Increase from 1859 to 1876 of the Population of the States commonly included in the term North West, viz. Ohio, Indiana, Illinois, Michigan, Wisconsin Iowa, and Minnesota.

	1885.	1890.	1895.	1900.	1905.	1910.	1915.	1920.	1925.	1930.	1935.
Population,	2,200,000	2,640,000	3,168,000	3,801,600	4,561,920	5,474,304	6,569,164	7,882,997	9,459,596	11,351,515	13,621,818
Total number of acres of all under actual well tilled,	8,800,000	10,560,000	12,672,000	15,206,400	18,247,680	21,897,216	26,276,659	31,531,991	37,838,389	45,406,067	54,487,280
Total of lands cultivated in yearly acres,	88,000	211,200	380,160	684,288	1,231,718	2,216,892	3,990,406	7,182,731	12,929,116	23,272,409	41,890,336
Amount of land remaining each period to be cultivated by square miles,	13,750,000	16,500,000	19,800,000	23,760,000	28,512,000	34,214,400	41,057,280	49,268,736	59,122,483	70,946,980	85,136,376
Value of the commerce of Lake Michigan tributary to the Georgian Bay,	$138,600,000	$177,408,000	$227,082,240	$290,665,267	$372,051,542	$476,225,973	$609,569,245	$780,248,634	$998,718,252	$1,278,360,163	$1,636,301,008
Tonnage passing St. Clair Flats in 1885, which is estimated to increase,	2,200,000	2,816,000	3,604,480	4,613,734	5,905,580	7,559,142	9,676,102	12,385,410	15,853,325	20,292,256	25,973,887
Estimated amount of Tonnage that would pass through the canal	1,760,000	2,253,000	2,883,584	3,690,987	4,724,464	6,047,314	7,740,881	9,908,328	12,682,660	16,233,805	20,779,109
Estimated revenue to the canal.				1,845,493	2,362,232	3,023,657	3,870,440	4,954,164	6,341,330	8,116,902	10,389,554

Let us examine the facts contained in this table for a few moments and first, as to population. It may be said that the ratio of twenty-nine per cent. will not be continued through thirty seven years. As above stated the ratio of the increase of population in the territory west of Lake Michigan, for the last five years, has been sixty-five per cent.—more than twice the figures from which our results are derived.

Take another fact. The census returns show that the entire Northwest, embracing Ohio, Indiana, Illinois, Wisconsin with the addition now, of Iowa, Minnesota and Nebraska, in 1820, contained 792,719 inhabitants; in 1857—the same period on which our results are based—they contained, in round numbers, 7,200,000 people, an increase in a little more than a single life time of one generation of NINETY HUNDRED PER CENT. With railways and telegraphs, and magnificent steamers on lake and river, and withal, the knowledge of the agricultural and mineral wealth of this vast country, the beauty and magnificence of its prairies, and the salubrity of its climate, now matters of daily conversation and newspaper comment in every portion of the civilized world, who shall say that the increase of population in the brave, favored land will not equal, in the next thirty seven years, the results of the same period in the past. Leaving out Ohio, Michigan and Indiana, that ratio would give, west of Lake Michigan, in 1895, within the territory of the United States north of the latitude of Albert and east of the Rocky Mountains, a population of 24,580,000. The result is very amazing, but it is not more wonderful than what large proportions of those now living, both in the United States and in Canada, have themselves seen and realized. Take still as other illustration. The old northern States proper have increased in the last thirty-seven years at the ratio of eighty-five per cent. It has been proved from the statistics of our railways for the past few years, and other sources, that about 250,000 people have annually emigrated into the country west of Lake Michigan. Apply the ratio of he increase of population of the old States to those already in the territory under consideration and half the ratio for half the time, to this stream of human energy that is now steadily flowing to it, and we shall have, in 1895 a population of 19,700,000. It is therefore deemed a moderate estimate to say that the persons of territory in the United States that is tributary to the Georgian Bay Canal will contain, only thirty seven years hence, a population of at least TWENTY MILLIONS OF SOULS.

The question next in order is, what will be the population of the territory under consideration, that is within the British possessions? There are no facts within our reach to show what the present population of the valley of the Red River of the North and at the trading posts of the Hudson's Bay Company, or but several thousands, it is believed, are already there. Any calculations, however, based upon their yet able increase, would fall far within the mark. For scores of years the Hudson Bay Company have kept the world in ignorance as to the extent and the richness of the country lying north and west of Lake Superior, using all the means in their power to strengthen the conviction that it was a cold, inhospitable region, fit only for the residence of Indians and trappers, and the wild animals whose furs were the only productions of this vast territory that could be made available for civilized man. This gigantic monopoly of this company is now, or soon will be, broken; the ignorance which it so industriously fostered, is now dissipated, and the people of Canada and Great Britain will assert their right to emigrate to and settle in this vast, rich, and inviting region. An immense stream of active, intelligent and enterprising men will, ere the next decade shall have passed away, be pouring into it from Canada, England, Ireland and Scotland, and by the year 1885, the foundations of a great and prosperous empire will be laid there, numbering even then not a moderate co-

[illegible]

general and it is certainly a pertinent question, where all these people to settle that portion of the United States and the British possessions are to come from? We answer They will be of a rare intelligent, the enterprising, and the vigorous sons and daughters of Canada and the older states of the American Union. Immense navies will be put in comm union to transport to this favored land the manu rious of our guests from England Ireland, Scotland France Holland Germany and Scan y all the other kingdoms and empires of Europe Where land is cheap, the soil rich and productive, the climate inviting and the government free and stable and life and property secure, there will the most intelligent millions of our race congregate for the next half century.

Let us canvass next the amount of land likely to be brought under cultivation It may have been noticed in this, as in regard to population, that the whole of Illinois is included in our calculations, but about half the state of Missouri lies south of the latitude of Akron, and having no means to divide either state, of the

Southern section of the case be taken for the northern seat on of the other the results will be sufficiently accurate for all practical purposes. The amount of territory likely to be under cultivation in the different periods, as stated in the table is the two low. It is much too small low. The population of the territory under consideration increased from 1886 to 1886 in the ratio of sixty-five per cent. instead of twenty-nine, the element used in the preparation of the table. There can scarcely be a doubt that there was twice as much land under cultivation in 1887 in Dilnoit, Watsonua, Iowa and Minnesota, as there was in 1886. We shall be disappointed if the census return of 1890 do not show an increase of three hundred per cent since 1880. At that time there were 6,814,781 acres under actual cultivation, as shown by the United States census. An increase of three hundred per cent. would give in 1890, 20,744,343 acres, or 32,413 square miles, and not 18,750 as shown in the table.

We must wait for the result of the census of 1890, to learn the actual amount of land which the hardy sons of the west shall have brought under cultivation, but the figures which exhibit the commerce of the lakes, as shown by Col. Graham's report above referred to, and the statistics of the commerce of Chicago for the past few years as proved by the able and carefully prepared statistical articles of the Chicago Daily Press, afford one of the most important subjects of study to be found in the annals of modern commercial progress. Thirty years ago the commerce of Lake Michigan was merely coastal, confined to an occasional—not of a small government vessel with supplies to the forts on the adjacent territories. In 1835 its value, as deduced from Col Graham's report, was $159,106,121. To be more particular we present the following table showing the receipts and shipments of grain at the port of Chicago for the last four years:

TOTAL RECEIPTS.

	1883.	1885.	1886.	1887.
Wheat, bush	8 084,832	7,580,037	6,627,700	10 884,152
Corn	7,490,125	4,525,977	12,883,380	9,509,787
Oats	4,394,905	3 867,186	4,201,620	7,073,252
Rye	89,721	83,286	46,597	69 811
Barley	307,782	302 966	193,647	197,599
Total	19,01 ,565	16,354,452	23,952,944	18,334,601
Flour, bbls wheat	723,971	1,526,510	1,525,000	1,870,078
Total	19,804,436	20,467,891	29,074,944	21,338,408

TOTAL MOVEMENT.

	1886.	1887.	1888.	1887
Wheat, bush.	3,203,181	6,338,111	3,327,495	9,665,628
Corn	4,327,800	1,267,218	1,249,238	2,516,451
Oats	2,259,611	1,264,223	1,214,548	2,478,771
Rye	41,187	1,319	949	
Barley	538,491	119,051	19,951	139,002
Total	10,370,271	10,019,822	6,812,181	14,784,486
Flour in lbs. Wheat	100,185	1,091,244	1,091,244	2,182,488
Total	10,470,456	11,111,066	7,903,425	16,966,974

The following table of the receipts of lumber shows the steady and wonderful growth of that trade for the last eleven years

	Tonnage cl.	Shingles.	Lath.
1847	23, 18,580	12,148,000	4,660,000
1848	40,000,000	20,000,000	10,000,000
1849	21 201 180	20,032 200	11 811 200
1850	100,000,000	21,000,000	15,000,000
1851	134 000,000	29,000,000	17,000,000
1852	147 018,000	17,000,000	16,000,000
1853	203, 01,000	18,000,000	20,000,000
1854	230,018,000	19,000,000	23,000,000
1855	208,000,000	160,000,000	28,000,000
1856	188,000,000	125,000,000	25,000,000
1857	192 000,000	101,000,000	20,000,000

The following table shows the number of arrivals at the port of Chicago in 1887 with the tonnage and number of men:

Number and Tonnage of vessels arrived at the Port of Chicago for the Season of 1887

	Steam.	Tonnage.	Sail.	Tonnage.	Men.
March	9	11	3	1 111	124
April	60	55	252	151,245	6,758
May	55	30	300	208,860	8,889
June	61	72	260	1,041	314,136	8,106
July	1	81	80	1,000	282,700	8,209
August	11	11	207	1,209	264,000	6,196
September	68	100	105	806	201 700	4,737
October	24	17	252	1 71	207,000	5,277
November	10	11	209	209	24,000	4,521
December	2	2	22	24	1 700	464
Total	305	1 18	2,295	2,295	1,665,8 1	47,881
Arrivals unreported, (estimated)			200		20,000	2,000
Total			2,207	2	1,685,8 18	49,881
Total in 1886			2,2 1	2	1,8 0,8	52,2 0
Total in 1885			2,0 0	2	1,8 0,8	
Total in 1884			2,071	2	1,8 2,8	

There were laid up in winter quarters at this port, 1886-7, 7 steamers, 20 propellers and 214 sail vessels.

POPULATION OF CHICAGO

We present the following table showing the population of Chicago at different periods:

1830	1,470	1860	90,586
1837	3,820	1870	306,605
1840	4,853	1880	503,304
1844	7,580	1884	650,000
1847	16,859	1885	707,614
1850	29,963	1886	750,000
1857	75,000	1887	1,000,000
1858	80,023	1887	1,100,000

RAILWAY PROGRESS.

In January 1852 there was but one railway the Galena, forty miles long, entering Chicago. The list of roads whose business tends to swell the commerce of that city now actually completed and in operation, is as follows:

	Miles.
Chicago and Milwaukee	85
Kenosha and Rockford	18
Kenosha and Janesville	55
Chicago, St. Paul and Fond du Lac	103
Milwaukee and Mississippi (Western Division)	104
Indiana and Chicago Union	160
Fox River Valley	62
Wisconsin Union	9
Rock Prairie	30
Beloit and Madison	7
Mineral Point	33
Dubuque and Pacific	93
Galena (Dubuque Line	102
Belvidere, Rock and Kishwaukee	68
Chicago, Burlington and Quincy	9
Do. Burlington and Missouri	93
Quincy and Chicago	159
Rock Island and Chicago	68
Chicago and Rock Island	14
Mississippi and Missouri, 1st Division	40
" " 2d "	50
" " 3d "	10
Peoria and Bureau Valley	47
Peoria and Oquawka	130
St. Louis, Alton and Chicago	304
Illinois Central	704
Pittsburgh, Fort Wayne and Chicago	353
Michigan Southern and Northern Indiana	248
Southwest Div. and Ch. ways	93
Michigan Central	283
South Bend and Salem	264
Huron branch and twenty branch and extension lines	1 105

The total earnings of all these roads for 1856, were $17,343,952.33 in 1857 they were $18,556,520.28 Only six years previous, the earnings of the forty miles in operation, were a mere nominal sum. The State of Illinois alone has now 2 775 miles of completed railway six years ago it had but 80 Comment upon the above tables and figures, for which we are indebted to the valuable yearly statistical article of the Chicago Daily Press, is scarcely necessary they show more clearly than language possibly can, the rapid progress of the North West in wealth, population and the means of commercial and social intercourse. Let it be observed that the remnants with the sawdust of all the scenery bordering upon the railways centering in Chicago, with the exception of the three eastern lines, the Michigan Central, the Michigan Southern and the Pittsburgh roads, must be tributary to the Georgian Bay Canal. Rather to entail. By the time the canal can be completed, thousands of miles more of railway extending in every direction through this vast, fertile region will be pouring the wealth of millions of enterprising, energetic freemen into the haven of Lake Michigan and the great majority of that remittance will flow through this magnificent highway for the trade of the east and the St. Lawrence to the ocean As steam will by this time have grown up north and west of Lake Superior which will contribute no trifles to swell the receipts and reward the enterprise of those who shall build this canal.

CONCLUSION

By reference to the preceding tables it will be seen that the Georgian Bay route is nearly three hundred miles shorter than any other except the Ottawa route, that it is 90 cents per ton cheaper than via Buffalo, and 15 cents per ton cheaper than via Welland Canal and Oswego. That by the Lake Champlain route, the Georgian Bay route is 25 cents per ton cheaper than via Welland Canal, and 95 cents per ton cheaper than via the Ottawa route.

That to Quebec the Georgian Bay route is 13 cents per ton cheaper than via Welland Canal and 38 cents per ton cheaper than on the Ottawa route

In point of time the Georgian Bay route would save almost one day over any other In comparing the Georgian Bay route via Oswego Champlain and Montreal we find that the route via

Champlain is 45 cents per ton cheaper than via Oswego, and to Quebec is 31.4d per ton cheaper than via Oswego and 31.4d per ton cheaper than via Champlain. There is hardly a doubt but what this margin is sufficient to secure at least a fair proportion of the immense trade of the west through the St. Lawrence and I can see no good reason why it should not secure much the largest share of it.

On the Ottawa route, not having very reliable information about it, but having up that over 300 miles of it would be close navigation, I have assumed 200 of it to be canal, or equal to a canal in expense of navigation. Several objections present themselves to this route.

1st. The route before so much further north than would be a line of from two to four weeks time each year in the navigation.

2d. It enters the St. Lawrence at a point where the trade must necessarily go down the St. Lawrence instead of having a choice of routes, unless the Cunghnawaga Canal be built, and in that event it would not have the choice via Oswego.

3d. The trade would be more divided between that route and Buffalo than it would be between the Georgian Bay route would be interrupted at Oswego and pass through more than 200 miles of the New York canals.

4th. The entire business would be lost to the St. Lawrence canals, and the direct benefit to Canada would be far less than by the construction of the Georgian Bay canal

The Georgian Bay route has the advantage of good navigation to and from it, crossing St. Clair flats and the dangerous navigation of Lake Erie, and at a moderate expense may have safe and commodious harbors at each end of it. There would be a saving of nearly 900 miles in distance, a saving in expense of transportation, and of time and insurance. If before Lake Ontario is reached where if the Cunghnawaga Canal is built, trade has a choice of three routes to the west and the entire business from west of them would pass through the St. Lawrence canals. It will be seen by Mr Tully's report that the supply of water is abundant, not only for the canal but for extensive water power and that all the water requires for construction are convenient.

It has been assumed in the comparison of the routes that the St. Clair flats would be improved so as to admit the passage of 1000 ton vessels. How difficult it is would be I am unable to say but I am credibly informed that the expenditures at that point hereto-

fers has not produced any beneficial effects in the improvement of navigation. It is probable, therefore, that as the event of the route being improved, that there would be more liability of interruption and detention than by the Georgian Bay route.

When we take into view the vast extent of country whose business must seek an outlet through this channel, the conviction is irresistible that the wants and necessities of the west will not be met until the Georgian Bay and Caughnawaga Canals are constructed, the Oswego and Champlain canals enlarged—the first equal to the Erie canal and the last for the passage of 1000 ton vessels, and the St. Lawrence improved for the passage of the same sized vessels.

When this is done a direct trade will be opened between Chicago and all parts of the world. To doubt this would be to doubt the intelligence and energy of the business men of Chicago, Milwaukee and the Lake Michigan cities.

They have already in fact, commenced the trade, and nothing is required for its successful prosecution but an improvement of the navigation, so as to admit of a large class of vessels.

Let us estimate for a moment the cost of these improvements.

Georgian Bay Canal,	$60,170,740
Caughnawaga Canal,	4,327,200
Champlain Canal, Enlarged,	2,970,000
Improvement of the Welland, &c.,	3,000,000
St. Lawrence Canal, Enlarged,	5,000,000
Total,	$80,467,940

Now suppose they cost $100,000,000 instead, I would ask, among the hundreds of millions of dollars that have been spent in public improvements could you select the expenditure of $50,000,000, the benefits of which are so widely diffused and promising, and vast as could be the return or would the completion of these improvements make considerations?

Let the cities of Canada awake to their true interest. Let them unite heartily in this enterprise, and great as it undoubtedly is, it can certainly I might add easily be accomplished. It would secure beyond a peradventure, for the cities of the St. Lawrence, Toronto, Montreal and Quebec, a leading and a commanding position upon the American continent.

In this connection I quote the language of Wm. Bross, Esq., editor of the Chicago DAILY TIMES, who, from the commencement

of the important enterprise, has devoted much time and energy to bring it before the public, used in a speech before the convention at Toronto, Sept. 13th 1866

"I once heard Capt. Symmis, a veteran sailor of our city who commenced his eventful career on Lake Ontario, in 1813, also referring to the great wind raising properties value of the products of the west, say That the great fact, when he made the mighty west, made also the lakes and the mighty St. Lawrence to float their commerce to the ocean and, I might add, as our attempts to hold the boiling current of Niagara, to the sea in hoop-pipe, as for why the products of those 100,000 square miles to the ocean by the Erie and the Welland Canals and all the railways now or hereafter to be constructed."

The same gentleman in an article in the Press, after showing the numerous benefits which the Georgian Bay Canal would confer upon Toronto, closes with the following paragraph in relation to Montreal, applicable, with nearly equal force, to Quebec

For the purposes of direct trade with Europe, in western Ports whether vessels of from the lakes go it vastly through or whether seagoing ves tels of equal as Montreal. In our judgment, carefully during the autumn transhipment there into any large steam vessels and westward would be found the most profitable In the steam propeller and sail vessels, especially if they could at once proceed home, might find it more profitable to accept from the exchange of the upon the steam and round the winter to the Americans or European receiving ports. But in any event, Montreal would hold a key to all the immense trade of the west, flowing down the St. Lawrence to the ocean. Her merchants would through unerring judgment of goods for the most from all parts of the globe, from which still compete with but made up in the lakes that. In any event, she would be as the trade of the St. Lawrence and New York is to that of the Hudson. In made use the enterprise on the part of her citizens corresponding to the magnitude of the interests at stake, to secure for her this grand position, beyond any contingency. It is true that national pride and economy exploit, and the hardest battle of commerce, was on the side of New York but that all nature and municipal than all these and in any intelligent man compares the Erie ditch with the mighty St. Lawrence, with a canal to pass vessels of 1,000 tons burden from Georgian Bay to Toronto, and the answer would be a moment on which side the immutable laws of commerce will decide the contest.

I am much indebted to the valuable reports of Co. J. D. Graham, U. S. Army John B. Jervis and William J. McAlpine, Esqrs., and to William Hemes, Esq. editor of the Chicago Daily Press, and others, for much important statistical information

Very respectfully submitted,

R. B. MASON *Commanding Engineer*

REPORT,

BY HIRAM TULLY ESQ

CHIEF ENGINEER'S OFFICE, }
Toronto, January 31st 1838. }

Sir. On the 14th of September 1835 the Committee appointed by the convention of delegates from Chicago, Oswego, Toronto and the one instructed me "to complete the survey of the route for the canal from Toronto via Lake Simcoe to the Georgian Bay on Lake Huron, and to report to the Committee with a topographical description of the country, levels, heights, sections, and approximate estimates for the construction of a canal capable of passing vessels of one thousand tons burthen a profile of the line to be furnished with the report."

The Committee also arranged that the members of the Chicago delegation should secure the services of one of the most eminent engineers, to go over the ground with M. Tully and act with him as consulting engineer in the progress of the survey.

In accordance with the tenor of the above resolutions, I herewith submit my report on the several proposed routes to which I consider my duty to have been confined, leaving to the consulting engineer Col. R. B. Mason, of Chicago the important task of furnishing the necessary statistical information in reference to the extent of the act expected trade that may be relied on as the means of defraying the cost of construction.

In my preliminary report to you as President of the Board of Trade containing a statement of the field operations of the various routes dated the 22d of January 1837 in accordance with that between the 19th and 23d of November 1836, I accompanied Col. Mason, the consulting engineer when he made an examination of the route and at a conference with the Committee held afterwards, a further survey of the route between Lake Couchiching at the north-eastern extremity of Lake Simcoe and Matchi-

adopt May was recommended by him as essentially necessary also approximate profiles of a route through Allumette and from the Mattawa river to the Nottawassaga river which was afterwards formally sanctioned and ordered by the Commission. In conformity with these suggestions and directions, I have also to submit the required information in reference to those routes with the plans and profiles of the same without which information the report could not be said to have been satisfactorily completed.

I have the honor to remain, sir

Your obedient servant,

EDWARD TULLY

THOMAS CHARLTON Esq.

Chairman of the Committee, and President of the Board of Trade, Toronto.

REPORT.

The peculiar outline of the western portion of the Province of Canada, with respect to the northern boundary line of the United States, has often been subject to comment by several public writers. The short distance between the Georgian Bay and Lake Ontario in the vicinity of Toronto across this western peninsula, compared with the circuitous route by Lakes Erie and Huron has long attracted the attention of those who have taken an interest in the progress of the section of the province and suggested this route as a probable means of water communication with the north-west.

From the earliest period of the history of this province, the route from Toronto by Lake Simcoe to the Georgian Bay on Lake Huron has been known and used as a portage by the Indians and traders to the north-west, in preference to the route by the Ottawa river or Lake Erie. The rapid increase, during the last ten years, of the population, and, consequent agricultural and commercial progress of the States of the American Union lying immediately west of Lake Michigan, and the serious loss to life property and shipping on the St. Clair Flats and Lake Erie also, the limited facilities afforded by the Erie canal for the transport of merchandise to and from those Western states have directed the serious attention of merchants and shipowners in the United States and Canada to the construction of the Toronto and Georgian Bay Ship Canal, as an additional means for facilitating the mutual commercial transport between the west and the seaboard.

It is now nearly twelve years since this route was first explored by me as the request of Dr Rees of this city (see appendix to report), but the probable cost of the proposed communication, compared with the prospective trade prevented any serious discussion on the subject. In fact it was considered altogether chimerical at that time, and beyond the mere exploration, the question was not entertained.

The cost of the extensive excavations that would have to be made through the ridge of land lying between Lakes Simcoe and Ontario, so as to permit the use of the waters of Lake Simcoe as a feeder to the proposed canal, was considered, at that time to be beyond the demands of the western trade; but the unparalleled rapidity with which this trade has increased during the last ten years and its undoubted future augmentation, has forced the question prominently on the attention of the mercantile community and the demand for an additional avenue is now extensively made.

In a letter addressed by me to John B Robinson Esqr, M P P for this city a copy of which accompanies the report, I have endeavored to point out the failure of the Welland Canal in diverting the west end trade to the River St Lawrence as the cheapest route between the north-west portion of this continent and Europe the necessary cut deemed for the construction of an additional avenue as a more northerly point than Lakes Erie and the superior advantages of this route over all others in reference to distance and anticipated economical working

I now feel satisfied, from tangible evidence, that the statements there made will be fully borne out and established in this report, and also in that of the Consulting Engineer Col. R. N. Massey, which is now in course of preparation.

The delay that has occurred in the completion of the survey was unavoidable. I was unwilling that any but reliable information should be presented to the public, as in the absence of reliable data, the future success of the undertaking might be seriously impeded, and the consequence of the canal delayed. In order to present the requisite information in as distinct and satisfactory a manner as possible, the report has been framed under the following heads.

1st. Terminal Harbor accommodations. 2d. Water supply to the canal. 3d. Cost of construction 4th. Comparison of the routes. 5th. General comparison with other routes 6th Collateral advantages. 7th. Conclusion.

L.—TERMINAL HARBOR ACCOMMODATION

At the convention held in this city on the 13th of September 1855, to consider the question of the construction of the Georgian Bay Canal, it was unanimously

Resolved, That the nearest route from the South-west towards the immediate construction of a canal between the Upper Lakes and Lake Ontario, of sufficient capacity to pass vessels of 1000 tons burthen from Lake Huron or Lake Georgian or Toronto as the vicinity

In accordance with the instructions of the committee, Toronto Harbour was made the starting point from Lake Ontario. The survey was so announced immediately west of the old Fort, and the ground between this point and Lambton on the River Humber was accurately measured and leveled. From the Grand Trunk Railway Bridge where it crosses the River Don a line was also leveled along the banks of the river and a branch of the Don which crosses Yonge street, immediately north of the city coming up along the base of the Davenport hill until it passed the western line. The nivelation of surveying and leveling these lines was to ascertain the approximate elevations of the ground above the level of the Harbour and Rivers and otherwise determine the feasibility of constructing both these branches, not only as termini, but also as an available water power the future advantages of which could be incalculable to the prosperity of this city for manufacturing and ordinary or chemical purposes.

I regret to state that without the expenditure of a much larger amount than will be required to construct the proposed canal by another terminal line, this desirable result cannot be obtained. The principal difficulties to be overcome are the insufficiency of the entrance to the harbour of Toronto to permit the passage of vessels of 1000 tons and drawing 12 feet of water and the necessity of constructing a high dam across the Humber and an aqueduct across the Black Creek at a point about two miles above Weston.

At the lowest water level of Lake Ontario, which must be taken as the datum as far as regards a terminal harbor there would be only eleven feet of water in the channel at the entrance and the bottom being rock, would not be deepened, except at considerable expense. As the proposed terminus of the canal was drawn from to the west of Toronto, a moderate weather only vessels could enter or leave the canal without entering Toronto Harbour but this is a contingency that should not be risked.

The [illegible] harbor accommodation for shipping when it is safe, many of [illegible] as under ordinary circumstances, and commodious. In no respect could this be attained at the proposed terminus west of the Queen's Wharf without the expenditure of a much larger amount than would be necessary if a harbor was constructed elsewhere. The only feasible line by which Toronto Harbor could be made the terminus would be to the east by the valley of the river Don, where the very little depth of water could be procured at a reasonable cost. This line would require the construction of an entirely new entrance at Ashbridge's Bay. To construct a suitable terminal entrance for the proposed Ship Canal, at this place, would require a much larger amount than would be necessary at the mouth of the Humber River for a harbor of a superior character.

Were there up the highest water level on Lake Ontario, which would give 21 feet of water on the present entrance to the Toronto harbor the passage of a vessel of 1000 tons and drawing 18 feet of water during a south westerly gale would be attended with great risk.

For these reasons I have come to the conclusion that the necessary terminal accommodation cannot be afforded at the harbor of Toronto within a reasonable cost. The explorations and surveys of the several routes demonstrate that the valley of the River Humber is the most direct and practicable line that can be adopted for the northern portion of the canal. The cost of constructing the canal from Weston to the mouth of the River Humber will not be greater than would be necessary under the most favorable circumstances and would be of an ordinary character whereas if the terminus was at Toronto, the apparent cost of the intermediate construction would be much greater as much so that I have not considered it necessary to run either the Report with a comparison of the estimates. In addition to the above the Eastern line with its terminus at Ashbridge's Bay would be [illegible] miles longer and the Western line, with a terminus at the Queen's Wharf, two miles longer than the Humber line. Under these circumstances therefore, I consider the Humber line offers the greatest advantages, and, in recommending this line, the Humber Bay would be assumed as the southern terminal entrance of the canal. By the construction of two pairs of crib work, 2,000 feet in length and 40 feet in width 200 feet apart, and extending into 20 feet of water with a depth of not less than 18 feet, at low water inside the piers, a terminal harbor [illegible] easy

of access, and commodious, can be obtained at the Humber. This bay is protected from the effects of south-westerly and easterly storms which are the most violent on Lake Ontario, by the Peninsula, south of Toronto about 4 miles distant, but there is little or no protection from south westerly storms, which prevail during the autumn unless when close to the entrance, which is sheltered by a projecting headland to the west. The distance to the opposite shore of the Lake being only 30 miles the force of the wave would not be such as to materially endanger the safety of a large vessel running between piers 200 feet apart and at 20 feet of water whilst smaller vessels of 600 tons can run into Toronto harbor in safety during unusually severe gales from this quarter. During the period of low water the Humber Bay with the proposed piers, would be the only available terminal harbor for vessels of the magnitude for which the canal is proposed to be constructed.

Within the line of shore, after passing between the piers the marsh is proposed to be excavated to the extent of eight acres, so as to afford sufficient accommodation for the anticipated traffic, and is capable of being enlarged if required.

For the terminal harbor accommodation on Lake Huron two points have been surveyed—one at the mouth of the Nottawasaga River and the other at Matchedash or Gloucester Bay. The selection of either of these harbors will in a great measure, be determined by the choice of routes, but, in respects the amount to be expended on each, the Nottawasaga River requires a less outlay. By the construction of piers of the same character as those recommended for the Humber Bay also 200 feet in length a harbor similar in many resp ects may be obtained. The mouth of the Nottawasaga River would be exposed to the north west gales of the Georgian Bay which are sometimes very violent in the spring and autumn, and would have a range of 100 miles to Cabot's Head.

The would re dounbt be a serious difficulty in a nautical point of view, but the risk would not be so hazardous if ordinary caution is used. Supposing a vessel to be running for the entrance of the canal at the mouth of the Nottawasaga River the vessel would pass close to the Christian Islands, under the lee of which shelter could be procured until the severity of the storm had passed when the entrance of the harbor 12 miles distant, could be reached in safety

The course would not be necessary during ordinary gales, but only in case of unusually severe storms. With this exception, Nottawasaga Bay offers every facility for a suitable terminal harbor the approach being marked with bold headlands, and with deep water and mile from the shore.

For the better explanation of the capabilities of this river and the Humber as terminal harbors I have prepared detailed charts of the same, which are herewith submitted. By reference to the chart of the Nottawasaga River which has been drawn from actual survey it will be noticed that the river extends in a southwesterly direction parallel to the line of the shore for a distance of nearly 3 miles with a width varying from 200 feet to 600 feet, and an average depth of 16 feet, containing available harbor accommodation of over 50 acres, at a moderate outlay for deepening and improvement, the cost of which is stated in the general estimate.

Gloucester Bay through which a vessel would pass to Matchedash Bay being what we termed land-locked would in the case of mining vessels, be objectionable on account of its being too much sheltered: but this we do not anticipate storms provided.

In order to render Matchedash Bay available as a terminal harbor it would be necessary to dredge a channel one hundred feet wide through the sector for two miles, and also to remove a large quantity of granite boulders. This item work would be attended with considerable and unavoidable expense the approximate cost of which is given in the general estimate.

On this account, I consider the bay inferior to the Nottawasaga River as a terminal harbor and am therefore strongly in favor of the latter

I am aware that strong objections have been urged successfully against the practicability of forming and maintaining a harbor at the mouth of the Nottawasaga river I cannot agree with such opinions, and would here mention that on my first inspection of this harbor, in company with Col. Mason the consulting engineer, more than two years since I did not hesitate to express my belief that a safe and commodious harbor could be constructed at this point superior to many of the harbors on the lakes, with which Col. Mason agreed and I am satisfied he has not since changed his opinion. In fact, we were both fully convinced that an industrious and populous city would sooner or later spring up on the banks of the river and the narrow peninsular which divides it from the bay

II. — WATER SUPPLY TO THE CANAL.

The proposed dimensions of the locks are 350 feet in length, as feet in width, 14 feet lift, and 12 feet on the sill.

Two locks of these dimensions would require 350,000 cubic feet of water, nearly for each vessel passing through the canal. If 480 vessels passed through during the day, 17,500,000 cubic feet would be required, or about 12,000 cubic feet per minute. According to two experiments on the quantity of water flowing from Lake Simcoe into Lake Couchiching, at the narrows, the quantity of water at this point amounted to over 100,000 cubic feet per minute, making due allowance for the friction at the bottom and sides.

The average rain fall of the water shed of Lake Simcoe (1,300 square miles), according to a statement assumed from the Meteorological Observatory, at Toronto [*See Appendix* (L), not extending over a period of seventeen years, gives 30.64 inches; and allowing for evaporation, absorption and vegetation, say 24.64 inches, we have twelve inches available rain fall per square foot for the year. That would give 89,000,000 per day, or 62,000 per minute. The available supply would be greater than this, judging by the experiments at the narrows, which give over 100,000 cubic feet per minute. According to experiments in the county of Hertford, in England, the evaporation effect was as 18 to 25, nearly or a little above 50 per cent., leaving 32 per cent. to be consumed by vegetation. What the amount of water from this source would amount to ascertained. But the sum of half would hardly exceed two-thirds of the whole rain fall, which would be 8.2 times as much as would be required to pass fifty vessels of 600 tons each per day as this would be the greatest number of vessels that could be passed through the canal conveniently in fifteen hours allowing a little over fifteen minutes for each vessel to pass through the locks. There will still be a large available water power which, along the entire line of the canal after passing the summit level will form a source of considerable future profit, by reason of the same for mills and manufactories.

Immediately after passing the summit, an additional water power would be also available from the water sheds of the Humber and Nottawasaga rivers, amounting to 40,000 cubic feet per minute, and as 800 cubic feet per minute respectively along the line of the canal based on the same calculations of an average

of twelve inches per superficial foot per annum. Further evidence as to the necessity and from the above sources there will not only be a sufficient supply of water to feed the canal, but a large surplus of available water power in fact, no considerable supply for the works of a much more numerous population has can be unoccupied at present.

In order to store up the rain fall of the Lake Simcoe water shed, it will be necessary to construct one waste weir and three dikes dams at the branches of the river Severn at the north-eastern extremity of lake Couchiching, the cost of which is stated in the general estimate.

III.—COST OF CONSTRUCTION.

The question also embraces the practicability of the construction of the several proposed routes.

The route as originally agreed on, commenced at Toronto or its vicinity passed along the valley of the Humber in a northerly direction, through the township of Kings, to the Holland river and Cook's Bay on Lake Simcoe from thence to Kempenfelt Bay on the western shore of Lake Simcoe. This starting point from Kempenfelt Bay was from the mouth of a creek about one mile from Barrie at the extremity of the bay thence in a westerly direction to the Nottawasaga river about one mile north of the Ontario, Simcoe and Huron railway line, and following the valley of the river to the Nottawasaga Bay the most southerly portion of the Georgian Bay Lake Huron.

ROUTE NO. ONE.

The terminal harbor accommodation having been already considered, it is only necessary to describe the extent and character of the works to be executed between the termini

Along the valley of the Humber there are no engineering difficulties of an extraordinary character as far as the 23d section at the lower run of Vaughan at 83 c, where the deep excavation through the ridges commences. This cut now extends to the 33d section or ten miles The greatest depth to be excavated will be 107 78

feet, or 8.24 under 200 feet. This will be the greatest depth from the summit. The ridges present a general trend nearly north and south the slope to the north being 4½ miles in length and the southern slope 4½ miles total length 10 miles. The depth of this excavation will average 90 feet, and will contain nearly 40,000,000 cubic yards and being composed as far as can be suspectered, of light clay and gravel will not cost more than 25 cents per yard, making a total of $12,000,000. From the 32d mile on to the 43d, by Cook's Bay a Lake Simsco the canal would pass through the Holland River marsh, following the course of the Holland River except at the bends of the river which are cut off. A considerable portion of this river is of an variable capacity and would require slight alterations, averaging 150 feet in width with a depth of water from 9 to 12 feet.

From the 43d to the 71st section at the western extremity of Kempenfeldbay it will be lake navigation where there are no difficulties to be encountered Lake Simsco being of sufficient capacity to admit vessels of a large tonnage navigating it with out any risk. At the 67th and 71st sections piers of timber crib work of a suitable character have to be constructed.

From section No. 1 to No. 6 there will be a deep excavation averaging 10 feet, the greatest depth at section No. 3 being 76 feet, and containing a little more 6,000,000 cubic yards at twenty-five cents per cubic yard the total cost of which would be $1,500,000 —the matter al to be excavated being of the same quality as described in the deep excavation in the ridges as far as can be judged from geological data, and color indications. [*See Appendix D.*]

At section No. 8, the character of the work comprises a chain of combination locks six in number From this section to No. 23 there are no engineering difficulties, as the canal will follow the course of the Nottawasaga River which will chief t improvements, can be rendered of sufficient capacity to answer the required purposes. This portion, 18 miles in length being liable to heavy floods in the Spring and Autumn will require a much higher towpath than usual which will slightly increase the average cost per mile. Between the 22nd and the 27th sections it will be necessary to cut a channel through the sand ridge which forms the southeastern bank of the Nottawasaga Marsh as sections save a distance of six miles, it being their being constructed across the river to maintain the water at the required level

The total quantity contained in the excavation will be over 8,000,000 cubic yards, the greatest depth being 100 feet, and the average depth 38 feet. The cost of this excavation would be $4,000,000.

From the 27th to the 29th section the work would consist of dredging the bed of the river for an average depth of two feet. The 29th section reaches the Nottawasaga Bay where a harbor is to be constructed as before described.

The locks are as follows: No. 1 will consist of two single locks, eight double locks, three treble locks, and three quintuple combination locks, being thirty-nine locks in number from Lake Ontario to Lake Simcoe, an average lift of a little over 12 feet, and the total lockage of 470 feet.

From Kempenfeldt Bay to Lake Huron there will be five single locks, and six combination locks, or altogether eleven locks, with an average lift of a little under 22 feet, or 126 feet in all—making the total lockage of route No. 1 to be 597 feet.

In nearly every instance where combination locks have been proposed, it was a matter of necessity from the nature of the surface. Though objectionable in many respects, it is of advantage in consequence of securing the height of the levels, which on this route will vary from 1 to 16 miles, not attaining the one summit level of Lake Simcoe of 38 miles. The total length of this route will be 187 statute miles.

The canal, if constructed by this route, would cross the Great Western and Grand Trunk Railways, and the Ontario, Simcoe and Huron Railway twice. At each of these points as indicated on the map a railway swing bridge must be constructed. Accommodation swing bridges of an ord nary character will have to be constructed at several points along the route. For crossing the deep excavation it is proposed to have four accommodation bridges 20 feet above the level of the water with inclined approaches of 1 in 20, each bridge to be two miles apart for the above length.

ROUTE NO. TWO

Comprises the first portion of route No. 1 between Lakes Ontario and Simcoe.

The construction of this line extends from the terminus on Lake Simcoe to Dr Robinson's creek on the north-west shore of Lake

Contributing at the north eastern extremity of Lake Simcoe, about midway between the "Narrows and the River Severn." The distance from Lake Ontario to this point being eighty one miles, from section 48 (O.S.) comprises Lake Simcoe the only difficult portion of the navigation being at the Narrows, which consists of a circuitous and hazardous channel. The Board of Public Works of the Province has ordered the necessary improvements, which have been in course of execution during the past year, rendering any additional expenditure unnecessary, except the contingency of deepening the channel still more, as the present improvement only contemplates accommodations for steam vessels drawing eight or nine feet of water

From Dr. Rosbrugh's creek to Matchedash Bay the canal would be fourteen miles in length.

Between sections Nos. 1 and 4, a deep excavation will be necessary principally through limestone rock, containing over 5,000,000 cubic yards, at a cost of the same amount as dollars the cost of excavation being estimated at $1 per cubic yard. The greatest depth would be 138 feet, and the average depth 76 feet. From section No. 4 to No. 8, the conformation is of an ordinary character between Nos. 8 and 9 an excavation, also through limestone rock, occurs, containing 600,000 cubic yards, and at section No. 13 an excavation through granite, containing 300,000 cubic yards, at a cost of at least $2 per cubic yard. Between sections 14 and 17 (Matchedash Bay) a channel will have to be excavated 100 feet in width and a roadway in ord work constructed the quantity of excavation a large portion of which would be through granite, would be nearly 6,000,000 cubic yards the cost of which would be $6,250,000, including the cost of the trackway and locks accommodation

The lockage on route No. 2, consists of six single locks, one double and one treble combined, also locks—11 locks altogether the lift being the same as for Route No. 1 between Lake Simcoe and Lake Huron, and the total lockage 600 feet

The total distance by this route, demonstrated No. 2, combining a portion of No 1 would be 80 miles conquering 52 miles of summit level including Lake Simcoe and levels ranging in length from one quarter of a mile to 30 miles.

The cost of bridging on route No 2, not including the combined portion of No 1 would be of 8 ng, as the country through which the canal would pass, is unsettled, excepting portions at the termini

A[illegible] would embrace a work 20 feet in width, and three miles of it would have to be constructed on the east side of the channel, to be excavated through Meadowdale Bay—this harbor accommodation to be continued to Gloucester Bay.

ROUTE NO. THREE.

Comprises a portion of No. 1 as far as the 14th section, from which point it branches off to the west, through the valley of the north-west branch of the Humber and the township of Albion and the valley of the Nottawasaga River in Tecumseth and Essa where it again joins route No. 1 at section No. 16, and continues along this line to the terminal harbor at the mouth of the Nottawasaga River

The deepest excavation on this route occurs between sections Nos. 13 and 28, containing 114,000,000 cubic yards, which would cost $33,600,000, and the greatest depth 50 feet, an amount which places this route, beyond all comparison, the most expensive.

It was considered necessary to survey several approximate estimates of the cost of this route, as several persons living in the township of Albion were under the impression that this was the most direct and cheapest route for the canal.

The cost of the necessary excavation, as stated above will, as a matter of course, swamp any remove the impression In addition to this cost, a feeder from Lake Simcoe would require to be constructed The furlongs would be the same as No. 1 and the length would be 33 miles.

ROUTE NO FOUR.

Comprises the principal portion of No. 1 as far as section No. 28, where it branches off from the Holland River through North Gwillimbury and Tecumseth toward the Nottawasaga River where it joins route No. 3, at section 32.

This was one of the routes approved and recommended by Col. Mason to the committee in 1864, and will be found to possess many superior advantages in comparison with other routes.

This route, like No. 3, does not enter Lake Simcoe, though it is proposed to be connected with it by a navigable feeder adapted

for a smaller class of vessels. The greatest amount of excavation on this route occurs between sections Nos. 2 and 3 ; on using 3,380,000 cubic yards which would cost 2,000,000, the greatest depth being 123 feet, and the average dep h 64 feet.

From section 32 of route No. 3 to section No. 10 of route No. 1 where No. 3 joins, there are no consecutive differences, as the fall in the valley of the Nottawasaga rivers is comparatively trifling for the whole of the distance (eighteen miles). The line then runs almost along to sec No. 1 to the terminal harbour at the mouth of the Nottawasaga river The haokage on this route will be the same as No. 1 (see foot), and the distance 18 miles. Several accommodation bridges will be required on this route.

ESTIMATE OF COST

Subjoined are the estimates of the cost of the proposed routes, route No. 1 being the least, and route No. 3 the greatest, the difference between Nos. 1 and 2 being trifling.

The cost of the harbor accommmodation at No. 3 is the largest, and Nos. 3 and 4 the least. It will also be observed, that in the construction of route No. 3 a much larger amount of excavation would be required than in the other routes, and more in order Nos 4 and 2 The size of the locks has been determined by the dimensions of the propeller "Iowa" of 1,000 tons, namely 248 feet long 34½ feet at de, and drawing 11½ feet of water when loaded making allowance for the necessary spaces for ope ting and clearing the gates locks 265 feet in length, 46 feet in width and 22 feet in the sill are considered sufficient for the purpose. Two schooners of 400 tons each can also pass through locks of these dimensions at the same time.

The canal is intended to be 110 feet wide at the water line and 72 feet in depth except in the deep excavation, where the width at the water line is proposed to be 160 feet and through the rock cutting on route No. 2 90 feet at the water level and 100 feet above the level of the towpath.

The greatest width of the deep excavations through the ridges in King would be 600 feet at the surface level.

ESTIMATE OF ROUTE No. 1

QUANTITY	DESCRIPTION OF WORK.	RATE.	TOTAL.
68,400,000 c. yds.	Earth excavation	20c	$13,680,000
	50 locks complete	$80,000	4,000,000
	6 dams	5,000	30,000
	28 waste weirs	4,500	126,000
	3 harbor accommodations	380,000	570,000
	3 Barrier Lake Dams	100,000	300,000
	50 accommodation bridges	6,000	300,000
	16 culverts	9,000	120,000
	Land damages		300,000
			$20,426,000
	Engineering and contingencies		6,586,270
			$27,012,270

ESTIMATE OF ROUTE No. 2.

QUANTITY	DESCRIPTION OF WORK.	RATE.	TOTAL.
64,000,000 c. yds.	Earth excavation	20c	$12,800,000
6,000,000 "	Rock excavation, limestone	67 c.	4,020,000
760,000 "	Rock excavation, granite	8 c.	60,800
	Locks		4,000,000
	Dams		30,000
	Waste weirs		126,000
	Harbor accommodation		300,000
	Lake Simcoe		300,000
	Bridges		300,000
	Culverts		120,000
	Land damages		300,000
			$22,756,800
	Engineering and contingencies		5,690,200
			$28,447,000

ESTIMATE OF ROUTE No. 3

QUANTITY.	DESCRIPTION OF WORK	RATE.	TOTAL.
33,000,000 c. yds.	Earth excavation including tunnels	20c	$6,600,000
	Locks		4,000,000
	Dams		30,000
	24 in Weirs.		108,000
	Harbor accommodation		600,000
	Bridges		300,000
	Culverts		120,000
	Land damages.		300,000
			$12,048,000
	Engineering and contingencies		2,409,600
			$14,457,600

ESTIMATE OF ROUTE No. 4.

Cubic yds.	Items of work.	Rate.	Amount.
10,000,000	Earth excavation	50c	$ 5,000,000
	Locks,		4,000,000
	Dams,		250,000
	Weirs,		60,000
	Harbor accommodation,		400,000
	Bridges		150,000
	Culverts,		150,000
	Land damages		300,000
			$10,510,000
	Engineering and contingencies,		1,120,000
			$11,630,000

COMPARISON OF THE ROUTES.

With respect to the terminal harbor accommodation routes Nos. 1 and 4 are on an equality and would in my opinion, be superior to No. 3, the terminal harbor of which would be at Meaford on Nottawasaga Bay. Besides the difficulty of constructing a breakwater strong enough to withstand the storms of Nottawasaga Bay there would be a great risk to vessels drifting aground not only on the west side of the channel during easterly winds, but also on Gloucester Bay. On the other hand theory and several large grain elevators would be required which, and construct a breakwater on the east side of the channel, through Meaford Bay would add nearly $1,000,000 more to the estimate. As a harbor of refuge, the west side of Gloucester Bay would be superior in every respect, and would afford the most ample accommodation for all classes of vessels during the season of navigation. For sailing vessels it is rather too much sheltered, but for propellers it would be accessible at all times.

In the early portion of the spring, and late in the autumn, its sheltered waters would also be frozen at least one week sooner than the entrance to the harbor being nearly in 5 degrees further north than the proposed terminal harbor at the Nottawasaga River. For general traffic I would, therefore, recommend the other routes in preference to No. 3, the terminal harbor accommodation. The comparative cost of the route is as follows:

No. 1	$11,630,000
No. 2	10,000,000
No. 3	11,065,000
No. 4	11,630,000

The results are stated in the estimate. With regard to cost, No. 1 route is most favorable. The difference between Nos. 1 and 4 cannot be considered sufficient to give one route a very great advantage over the other in this respect; but the cost of route No. 3, being similar precludes any further argument in its favor. The comparison, therefore, between Nos. 1, 2 and 4 will be narrowed to the question of facilities of construction and economical working. The heavy amount of rock excavation encountered in route No. 2 appears objectionable on account of the increased price, but the quantity being much less on account of the side slopes being decreased, the difference of cost will not be so great as stated in the estimate.

The insurance to be exonerated being of a quality that could be used in the construction of the locks on this section of the route, if not so there, would diminish the cost of this excavation. As this is, in a great measure a matter of conjecture, no deduction has been made in the estimate on this account, particularly as it is probable that the stone required for building the locks on the remaining route as well, be procured from other localities.

The question of terminal harbor accommodations and coal having been decided, that of economical working has next to be considered. The lockage being the same on all the routes, the length of the routes and time occupied in passing through the canal, will determine the superiority. The respective lengths and time will be as follows:

ROUTE	LENGTH OF ROUTE.			TIME IN HOURS.		
	Lake Simcoe.	Georgian Bay.	Total.	Lake Simcoe.	Georgian Bay.	Total.
Route No. 1	33	33	66	37	9	46
Route No. 2	33	36	69	33	9	42
Route No. 3	28	40	68	30	9	39
Route No. 4	24	45	69	30	9	39

In the above calculations the rate of speed on Lake Simcoe is calculated at six miles per hour, the remainder three miles, and four miles on the other levels. Nearly twenty minutes is allowed for passing each lock.

The comparison in time would be in favor of route No. 3. The terminal harbor accommodation being in favor of Nos. 1 and 4, will give them a greater advantage, according to my judgment.

The comparisons therefore, will rest between those two latter routes. In point of time, then, the difference as of no consideration—the principal and final objection to route No. 1 would be the probable delay to sailing vessels passing through Lake Simcoe on consequence of adverse winds, as whom No. 2 would not be subject.

Would this inconvenience, as consequent expense, be at all in proportion to the difference between the cost of the routes, namely $1,200,000? I think not—and I am the more inclined to this decision from the certainty that the majority of the vessels passing through the canal would be propellers, which would not be affected by adverse winds at least, it would not prevent their continuing passage through Lake Simcoe, or in fact, from either terminus, except during very severe storms.

Under all the circumstances of comparison, this route as originally proposed, appears to be the best, and I am not aware that any further local examination would alter the decision as in every instance I am satisfied that the most favorable locality was selected. In any comparison, therefore, with other or existing or proposed avenues for the western trade, the route from the river Humber west of Toronto, to Lake Simcoe, and from thence to Lake Nipissing, by the Nottawasaga river, will only be considered,

The estimated cost being	$30,000,000
The length	100 m. m.
And the time	36 hours.

V.—COMMERCIAL COMPARISON WITH OTHER ROUTES.

The existing water communications between Lakes Superior, Michigan and Huron and the Atlantic Ocean, are as follows

No 1.—By	Lake Erie, Buffalo and Erie Canal.		
No 2.—	"	Welland Canal, and Oswego and Erie Canal.	
No. 3.—	"	"	and the St. Lawrence.

The projected water communications, as ship canals, are

No. 1.—By	Lake Erie, Welland Canal and St. Lawrence.	
No. 2.—By	Georgian Bay, Toronto and St. Lawrence.	
No. 3.—By	"	Ottawa River and St. Lawrence.

To which may be added the proposed ship canal between the St. Lawrence, Lake Champlain and the river Hudson and from Oswego to the river Hudson. Nos. 1 and 3 of the existing routes have New York as their sea port and Nos. 2 Montreal and Quebec.

For the proposed routes, New York Montreal and Quebec would be the sea ports, in case the proposed ship canals between Montreal and Oswego and the Hudson river were constructed, and the St. Lawrence canal enlarged.

Chicago being the centre of inland commerce at present, will, in every comparison be made the starting point, and east terminus.

The city must be selected as the starting point from the west, for obvious reasons. The rapid growth of Chicago in all those elements which constitute a great commercial and enterprising city in its marvellous history, a prosperity and progress unparalleled in the commercial history of the world, justifies the well earned title of the "Center of Western Commerce."

The cities of Milwaukee and Superior also Waukegan, Kenosha, Sheboygan and Green Bay are perpetually interested in the construction of this advanced system for their trade, and will no doubt unite with Chicago and Canada a ensuring its accomplishment.

A division of interests in advocating the construction of other channels for western trade, until this is completed would be fatal to the success not only of this project, but of all others which are designed to facilitate the transit of western commerce.

Comparative Distances and Estimated Time of the Existing and Proposed Routes,

FROM CHICAGO TO NEW YORK.

No.	Route.	DISTANCE IN MILES.			Leakage, Height in feet.	TIME IN HOURS.				REMARKS.
		River and Lakes.	Canal.	Total.		River and Lake.	Canal.	Leakage.	Total	
1.	Ill., Mich. Erie canal and Hudson river	1,54	154	540	699	56	121	17	201	The Distance from Chicago to Buffalo, is taken as I 60 miles, and from Chicago to the Georgian Bay as 800 miles. See report on Ottawa route W. Shanly C. E.
2.	Welland, Georgian canal and the Hudson river	1,401	197	1 598	1 040	126	79	98	303	
3.	Welland, Ottawa ch. canal and the Hudson river	1,401	164	1,565	600	210	58	16	284	
4.	Georgian Bay, Toronto, Ottawa and the Hudson river	964	286	1,250	1 s 0	116	85	83	284	
5.	Georgian Bay, Toronto St. Lawrence and the Hudson river	1,301	118	1 419	900	50	71	30	241	
6.	Georgian Bay Ottawa and the Hudson river	971	860	1,878	720	183	190	18	551	

FROM CHICAGO TO QUEBEC.

7.	Welland and St. Lawrence river	1 092	94	1,186	660	139	24	13	176	See comparison of estimates Rep. Board of Works (Lands) Report, 1874
8.	Georgian Bay Toronto and St. Lawrence	1 092	150	1,242	900	140	40	20	200	
9.	Georgian Bay Ottawa and St. Lawrence	971	8 2	1,180	660	132	70	7	209	

N B —In the above tables, for trains going down, eight miles an hour is allowed for the rate of speed on the river and lake, three miles an hour on the canal, and one and a half minutes for every foot of leakage.

New York to Liverpool, 3,000 miles: Quebec to Liverpool, 2,802 miles; difference in favor of Quebec, 198 miles.

By the above table of comparative distances, it will be perceived that the Toronto and Georgian Bay Canal would not only be the shortest of existing or proposed routes in existence, with one exception, but allowing for the increased tonnage would also be the shortest in point of time, whether New York or Quebec is the seaport. By a comparison with the charges of existing routes to New York, namely, Buffalo, Erie canal and Hudson river, the Toronto, Georgian Bay and Owen Sound route would be 400 miles and about four days shorter in point of route, allowing fifteen working hours for each day during the season of navigation.

Also, by comparing the Welland and St. Lawrence to Quebec with the Toronto, Georgian Bay and St. Lawrences, the latter would have an advantage of 428 miles in distance and save over three days. In the above calculations the detention in passing the St. Clair Flats are not taken into consideration, which according to the argument in favor of the construction of the Rondeau and Chatham ship canal averaged six days for each trip, or three days either way. The average inland leases to shipping at this point alone, irrespective of detention, has been calculated at $1,500,000, which would be so much saved and in favor of the Toronto and Georgian Bay route. On this basis a comparison may be formed between the above and any of the other routes, and in every instance it will be found to be still more favorable.

The difference also, from Chicago to Liverpool by the Georgian Bay Toronto and Quebec is 492 miles less than by Toronto, Oswego and New York, and 857 miles than by the present route by Buffalo Erie canal and Hudson river.

It is admitted that the time has now arrived when Ship Canals must be constructed to connect the great lakes with the Atlantic Ocean, then the Toronto and Georgian Bay route possesses still further advantages over all others existing or projected. The expense and difficulty of deepening St. Clair Flats from 14 to 21 feet, and, it may be stated, unprecedented, except at a considerable expense, would be an effectual barrier which could only be removed by the construction of the Rondeau and Chatham Ship Canal, at this point, at an estimated cost of $6 000,000. The proposed lateral cut to the Welland Canal has also been estimated at $4 000,000 There we have a proposed expenditure of

$10,000,000 of Canadian capital which, if expended in the construction of the Toronto and Georgian Bay Ship Canal would leave but $15,000,000 to complete a work which would save 448 miles by the Quebec route, including the hazardous navigation on Lake Erie, which is admitted to be the most dangerous compared with all the other lakes.

The tendency of the construction of the Rideau and Chambly Ship Canal, the most feasible and economical method by which the navigation of that portion of the St. Lawrence can be improved, would be to facilitate the existing trade to and from Buffalo and the Erie Canal the proportion of the increase of trade to the Welland Canal and St. Lawrence could hardly be expected to be at all commensurate with the cost of the undertaking as far as this Province would be concerned.

Since 1847 "when the rivalry for the carrying trade of the great west was fair by between Canada and the State of New York," the expected trade by the St. Lawrence has been gradually diminishing in comparison with the Erie Canal. During the approaching season the enlarged Erie Canal will offer increased facilities for western trade, and the trade of the St. Lawrence will be still further reduced. It has been fully remarked that all the canals railways, and other means of communication that can be made across the Canadian peninsula for the next twenty years will not afford sufficient accommodation for the gigantic increase of the commerce of the great West. Admitting the truth of the above remark, it would be insane state to oppose any of the projected improvements either by Buffalo Montreal, but the superior claim that this route has on Canadians should be first considered and our energies directed to its early completion. If its construction will restore the trade to the St. Lawrence that has been lost, then we ought surely to protect against Canadian influence and capital being expended on every prospect.

With respect to the capacity of the proposed Toronto and Georgian Bay Canal, in comparison with those of existing routes it will be unexcelled as soon to be superior in every respect.

The passage of 60 vessels per day of 1000 tons each, or 10,000,000 tons in 300 days, which is the estimated yearly period of navigation, would meet the requirements of the trade for some years to come, while the present traffic about 8,000,000 tons, is quite as much as the Erie Canal can conveniently accommodate

and the annual increase will continually demand further enlargement until at length a ship canal of the proposed dimensions in this locality will be required.

Instead of this wretchedly costly method of continual enlargement, the most expensive that can be adopted, would it not be more advisable to construct additional avenues, thereby creating increased facilities for internal transports? This under all circumstances, would appear the reasonable conclusion and which it is to be hoped, will yet be arrived at by all parties interested.

VI.—COLLATERAL ADVANTAGES.

The direct advantages that will follow the construction of the Toronto and Georgian Bay Ship Canal in opening a shorter and more expeditious route between Lakes Superior Michigan and Huron and the Atlantic Ocean, has been argued in the foregoing general comparison of routes.

The collateral advantages may be considered as being of a scarcely local character though their connexion with the main project will become more evident as an auxiliary when the work has been completed.

According to the calculations of the available water supply it has been computed at 40,000 cubic feet per minute the supply from the summit to the north and south would be augmented by the rain fall of the water sheds of the Humber and Nottawasaga rivers, which is computed at 82 000 cubic feet per minute making a total of 202,780 cubic feet per minute, or 80,000 cubic feet for the 80 therm or Humber portion, and 112,000 for the northern or Nottawasaga water shed.

These quantities multiplied by the height, 180 feet for the northern, and 270 feet for the southern would give the available water power of each an unfailing source of considerable profit, being in the vicinity of a populous city and of incalculable value for manufacturing and mechanical purposes.

CONCLUSION

In order to convey a clear idea of the position and advantages of the proposed canal, lithographed plans and profiles are now se

course of progression, having been reduced from the original plans and profiles which accompany this report.

The first map will represent the united counties of York and Peel, and the county of Simcoe, on which the proposed routes are measured. The second plan will contain reduced profiles of the routes, and the position and number of the locks.

The last will be a prospective map, showing the general position of the proposed ship canal to connect Lakes Huron and Ontario at Toronto, in reference to Chicago, New York and Quebec, with the existing and proposed routes and comparative distances before mentioned.

As soon as Col. R. B. Mason's report is completed, it is proposed to have it printed, together with this report, appendix, and plans attached, so as to present the whole in a complete form, and convey the requisite information in as concise a manner as possible, consistent with the importance of the project.

The advantage of having a correct representation of the topography of the country lying between the city and Lake Huron, with the lines of the water shods of Lake Simcoe, and the Humber and Nottawasaga rivers, will be evident on the inspection of the plans, and has influenced the committee in incurring the additional outlay, which they feel certain will be reimbursed.

The estimated cost of the undertaking will at first appear considerable, but on consideration of the immense advantages that will result from its construction, in comparison with the other public works not yet completed in this Province and the United States, within all the reflection justify the expenditure of a much larger amount than may be here anticipated when the project was first contemplated.

The cost of the Grand Trunk Railway when complete, including that enormous engineering work, the Victoria Bridge at Montreal, has been estimated at $16,000,000, more than double the original cost of the canal. The railway extending from Portland to Stratford, a distance of 174 miles, the remaining portion between Stratford and Sarnia, 70 miles, is expected to be completed this year in connection with a railway across the peninsula of Michigan, thereby forming another link between the Atlantic and Great West. The cost of this railway has ceased to be considered a serious matter in comparison to the anticipated advantages; it is now an established fact; the sense of the Legislature having stamped it a national undertaking, and as such deserving the most zealous

supplies of the Province generally to which it has already been indebted for considerable advantages by increasing the facilities of communication, it has promoted the agricultural and commercial interests of the community in some instances more than quadrupled the value of real estate, and laid the foundation of future prosperity and independence.

If Goderich worthy objects of imitation to a new country like Canada, they should be upheld by the unanimous voice of the Province. If such not to retrograde to our log shanties, cordurey roads and unmounted conveyances. By way of contrast, I would mention that the journey between Toronto and Coburg, which was formally unavoidable to be through by day-light, a distance of 70 miles, occupied 24 hours in its accomplishment, under difficulties of no ordinary description, to this I can personally testify having, "gone through by daylight" by mail, and daily arrived next morning about the same time at which we started the previous evening. The steamer used in the Autumn of 1847 last Autumn I traveled to Coburg and returned the same day in seven hours, having seven hours to spare for the transaction of business, and went "through by day light" in reality, not by terms.

The immense traffic on the Great Western Railway during the Autumn of 1864 [last year on hardly be considered even an average by which the travel can be estimated, would impress a careful observer with some idea of the extent of the western trade. This railway was also constructed as a speculation of avidity, and its success as a profitable speculation is undoubted, and its advantages fully admitted by the stockholders. Several other lines are projected to pass through Canada in competition with the above mentioned railways and on the south shore of Lake Erie in connection with the Michigan Central Railway also commands a large share of western traffic. These railroads may be considered foreign to the subject, but in every instance they are feasible illustrations of the magnitude of the western trade. It is needless here to refer to the extent and prospective increase of this trade it is well understood and appreciated by those who are interested in its developements it will be considered sufficient to remark and it is not unreasonable to surpass judging by the past, that before the Toronto and Georgian Bay Canal can be constructed the trade of the west may demand a superior capacity of basin, and greater facilities than those at present contemplated. The retention of

the trade of the west by the Erie Canal, notwithstanding the enormous expenditure and additional facilities annually afforded by the St. Lawrence route, as forcibly commented on by the Hon. John Young in his letter to the Hon. F. Lumsden, Chief Commissioner of Public Works. He states:—

"It would be easy to multiply facts to establish the same general results; but the figures above given will sufficiently show that which we can neither deny nor controvert, namely, *that the trade to the home St. Lawrence, as the produce of the West, is paltry and insignificant compared with what it ought to be, and compared with that by the Erie Canal.* That our present facilities for transporting property are wholly inadequate to secure successful competition with the more southern route. It is useless to overlook or underrate the result: it is forced upon us every year more and more plainly, and was foreseen by every intelligent merchant examined with the Western business, and is corroborated by other facts."

In the latter part of 1865, the route by the Ottawa was practised as a measure for this sickly trade, after the proceedings in Toronto had become public. Lake Nipissing, where the proposed feeder of the Ottawa Canal, being two degrees further north than the northern terminus of the Toronto and Georgian Bay Canal, the period of traffic each season of navigation on the Ottawa route would be diminished at least 14 days in the spring and autumn, or one month on an average; and to this may be added the inconvenience of a close navigation for 300 miles between Lake Huron and the St. Lawrence as contrasted with 77 miles by this route. For these reasons, and a great deal of effete data as other respects a poor parison may be accused. The terminus of the Ottawa route on Lake Huron will be too far north to compete with the Erie Canal and, on the contrary, the Welland Canal is too far south. The Toronto and Georgian Bay Canal route is a direct line between the direct points of traffic, namely New York on the south-east, and the junctures of the three lakes, Superior, Michigan and Huron, on the north west, would if constructed possess superior advantages in this respect. In the "Prize Essay on Canada" written by J. S. Hogan, Esq., M. P. P. for the county of Grey the comparison been con in the rules of the St. Lawrence and Erie Canal routes is so clearly described that it is thought not able to copy it in full, by permission

"Measuring the St. Lawrence, then, as a highway to the ocean, by the standard that it can be superseded by more rapid, cheaper, or more convenient routes, it cannot be unsuccessful. If it does not fail into disuse, what are its future prospects?

"The first thing that strikes one in contemplating it, in the adaptation, in point of convenience, to the vast regions it waters. Whilst the business necessities of the West, and those portions of America which are universally admitted to be, both by their relative position to other rivers and to it, its natural feeders, have literally chained the enterprise that were intended to provide for them, by vast magnitude and its value are being but discovered by the continent. The Erie Canal mighty valuable as a work, and economically beyond comparison, *has been made little by progress.*

"The St. Lawrence, on the contrary, only requires improvements to test its greatness. It is impossible, indeed, to contemplate that River in connection with the canal that was made to rival it, without being struck with the inadequacy of the one and the amplitude of the other.

"The valleys and plains watered by the St. Lawrence belong largely in the United States, have chiefly contributed to the Erie Canal's business. Their fruits were literally wrested away from their natural channel to tunnage in its prosperity. The Laws recede in so far as American policy, and great restrictions upon commerce could affect it, has been enriched to the Erie Canal Maine's untilled but navigable lows, which drove commerce away from it, in combined together. The Erie Canal has its Canadian advantages to the river connected into advantages in its favor. Yet the laws of progress, which have swept away the obnoxious navigation restrictions, have, at the same time, sealed the fate of the Erie Canal. Not that it a improvement as an enterprise, nor that, *as a local work it is not* a management as a specialist on but that, for the great purpose of its construction name *to* convey to the ocean the fruits and productions of the West and North west, it is empl ntially a failure, *because progress has completely overburthened it. It is literally surfeited by its own prosperity.* And it matters not to him—an individual, in such a case, being the same—who has boards or flour to send eastward by it, whether they are stopped by season of starvation, or because of a surfeit. The impediment to his business is the all-important question with him And though the Erie Canal paid

larger profits than any other work in the world, yet, in a national point of view, it is afforded not adequate facilities for business, or stopped it in its course. It might, by drawing to it what it could not do, be the means of wide-spread evil instead of general good. And that this is, to a great extent, the present position of the Erie Canal, is universally admitted.

To obviate these difficulties, enterprise has again undertaken to swell its dimensions to meet the enormous demands of *progress*. But in view of the vast regions which are common alike to it and the St. Lawrence, and which are as yet but in the infancy of their population and business, *is it* not probable, nay, is it not certain, judging by the past, that twenty years hence will find the Erie Canal again choked up with business—again *made liable by progress?* When the magnificent tracts of country embraced in Michigan, Wisconsin, the northern portion of Ohio and Indiana, Illinois, Iowa, Minnesota, and the west and north west portions of the State of New-York, which now wholly or largely use the Erie Canal as a highway to the ocean, come to be settled, as they will to have, instead of some five or six millions of inhabitants, at least eighteen or twenty, what *vast canal*, with its hundred locks, and its hundred other impediments, will be equal to their vast business necessities? will be in keeping with their splendid progress? will satisfy their craving for rapidity, *unquietude* and commercial convenience? Will not the Erie Canal *then*, enlarged though it *may be once more*, subject us to the *enormous injustice* of *America, of progress utterly disheartening enterprise, and prosperity thanking the calculations sum of talent.*

Are any further arguments necessary after the above almost prophetic demand for an additional and enlarged avenue for Western trade, as can not be refuted by progress?

As a demand for improving and developing the mighty resources of this inland zone the above arguments are not only unanswerable, but, on reflect on will be also tod to be incontrovertible.

Before concluding this Report, I would to act this as the most fitting opportunity of thanking A. M Ross, Esq. George Tate, and Walter Shanly Esqs., Civil Engineers connected with the Grand Trunk Railway for important statistical data and other information Thomas Rolfson and S. Fleming, Esqrs. Engineers of the Great Western and O. S. and H. Railways, for the use of plans also to F P Rubidge, Esq., of the Board of Public Works,

and Thomas Devine, Esq., of the Crown Lands Department, for the valuable information afforded by them, thereby facilitating my professional labors, and placing valuable data within reach, which could not otherwise be procured, without incurring further labor and loss of time, and entailing additional expense.

I have the honor to remain

Your obedient servant,

KIVAS TULLY

THOMAS CLARKSON, Esq.,
President of the Board of Trade,
Toronto.

APPENDIX A

LETTER FROM R. A. BOYS, M.C.

"In regard to my comparative advantages for freight, I think you might consider the immense quantity of pine timber on the north shore of Lake Huron. Already large facilities have been taken up, and extensive mills will be immediately erected. The description of mills about to be erected will make 20,000 feet per day while, for each mill, will make 6,000 lum per annum, allowing one and a half tons per M. which is low. These mill sizes do about six of those mills in operation, making annually 36,000 tons of freight, and with each succeeding year an direct shipping to Liverpool, the Wave harbor, on the west shore of Lake Huron alone would employ 100,000 tons of shipping annually. Besides this freight of forest timber there are the vast white oak forests. In some, at present, about $100 per thousand feet to take square white oak from the north of Lake Huron to Quebec, which is virtually a prohibitive whereas, could it be shipped direct, one quarter of that sum would pay the entire transport, making an enhanced value for the timber on Lake Huron of two hundred per cent.

"With such a prospect, the amount of timber that would be manufactured can scarcely be calculated. But I should say that Canada alone, on Lake Huron, would require at least one thousand vessels of one thousand tons each, to carry off her immediate surplus of sawed pine, square pine, both red and white pine masts and spars, spruce oak timber, etc. etc. Besides, what a trade would immediately spring up in ship building. What trades above could be selected for this purpose than the proposed outlet of the canal on Lake Huron (Nottawasaga, Bay). At the mouth of the river is a deep reach of three and a half miles bay, where one hundred or two hundred of the largest class of ships might be built. A cove and the same bay, and, when built and afloat, they could be a perfect security.

"The money for manufacturing spars, both white oak, white and red pine timber, spars and masts, can be put up the river where there are some thousands of acres of those timbers, of the finest quality which can be floated down in the dry yards with the greatest ease.

"Besides, this is only a small item in the prospects for freight. The grand west is the country from which the bulk of freight must come. When we see what the trading Lake Mexico a year and more of the difficulty in getting to it, in the way of freight, what must we expect from Lake Michigan, and that great and almost unexplored inland sea, Lake Superior?

The impetus that the ship canal would give to the timber, mineral, fish and grain commodities, would be incalculable. It would be the opening up to enterprise of a new world, already teeming with life, and ready to communicate to any outlet, as long as there is demand, an immensity of the above named articles, namely lumber, mineral, fish and grain and of the best description, being proximately inexhaustible.

APPENDIX B

THE TORONTO AND GEORGIAN BAY CANAL.

TORONTO, January 30th 1888.

DEAR DAWSON,

As the Report on the Toronto and Georgian Bay Ship Canal will soon be published, I feel obliged by your sending my pamphlet with which you may be associated by reference or the same, for the purpose of publication, being assured that the several papers you have taken an active interest in for promotion, as for original programme

Believe me to remain, yours very truly,

HUGH TULLY.

WM. DAWSON, Esq. M.D., Toronto.

TORONTO, January 21 1888.

DEAR SIR

In reply to your note, thinking my pamphlets I may possess with reference to the Georgian Bay Canal, I have only to state, after having perused your valuable report, together with the map of Col. Rowan, C.M. R. one of the highest authorities in the United States, that anything I could communicate must be of very little value. I may however observe, that for my daily service professions connected to selling public securities to the people through the columns of the Globe, for 1865, that I had the more confidence of the pamphlets, within the rapid studies since made, both at Canada and the western States, than I conceive, fully proved the justice of my sentiments and very strong appeals to government at that occasion, and more with reference to the above, but also as to the claims of other important parts of the country as constituents, to the direction of the Trent, Ottawa, and Bay of Quinte with views to perfecting the 3rd Lawrence navigation, from my last labored mem to the Admiralty also, to affording greater encouragement to navigation and settlement, &c. &c. and as I am also assured that the fertile districts of Lake Huron, and the rich valleys of the Ottawa and S Maurice have been judiciously laid out at the

[1] In this suggestion of mine, Mr. John Cameron has shown an appreciation of the choice of being between Lake Simcoe, the Trent and Bellville, suggesting, with his colleagues, which resulted in the construction of certain locks, dams, and other partial improvements.

period reduced to, one possibility, unsatisfactory and nervous, might have been nearly double what they are at present, and it becomes be denied that, on the establishment at the west-basin, the improvement of the St. Lawrence together with the new ports of Cowbay and Montreal, mainly depend the future advancement and prosperity of this country.*

This commercial navigation will serve be perfect, on communication with the rapid-increasing inhabitant by the progress of the last few years, and that is be merely a question of time (however absurd the time may appear), where inside the Georgian Bay and the Western Canada shall be connected, canal has become an issue, acknowledged by the Province, vessels proceeding would have the advantage of the late navigation main prevailing shoals and currents of the water below Montreal, where they would arrive in the time at present occupied in reaching Buffalo. By the latter, an Ohio vessel upward bound vessels would have the hazard of an adverse, unfavourable, and tedious route to the head of the Niagara Bay whilst in the lower St. Lawrence a further improvement may be effected in the saving of from 200 to 300 miles, by means of a short canal at the head of the Bay of Fundy thus shortening upon the eastern American and Canadian coast, and perhaps, at the same time, simplifying the advantages contemplated by the proposed Channel between Chicago and other ports at the head of Lake Michigan and Lake Superior being thereafford best to the commercial world.

To this St. Lawrence, on the natural basis of the great lakes and the regions that belongs the trade, is universally admitted, that with Montreal as being one-fourth the distance nearer Europe, together with the facilities presented for its improvement, the least manual labour combined to take the most southern channels, there will the more important shall have been effected, must be equally evident.†

Perseverance him with the right hand and endurance of a Canadian navigator who knows no obstacle; perseverance in the great commercial and resource is certain. The hope, the majority of Canada to be her highways as the basis of her national wealth, must be her agriculture, her domestic industry and her commerce.

Bold conspectus and enlightened legislation consonant with the spirit of the age and a whole able people protected (which even the Canadas cannot long be protected), should be united in confidence, is impressively demanded.

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* A Welland or subsidiary floating dock has become an essential at Montreal as the Victoria Bridge, whilst the lifting up and dockyards at East under-harbour, are examples of England, should be erected. Montreal, subsidiary port to Quebec, should, like subsidiary ports to Quebec, like those on the Clyde a simple means of facilitating in the most time, the commercial, north-easterly, of the Medway a confederacy to be shall develop.

† It has long been ascertained that the largest and most approved vessels must on certain channels of the vicinity or embarking be the less the proposed canal, may suppose variety of embarkations and but, under most advantages, on the main route of Europe, vessels below may not be employed.

‡ In connexion with the above, the Halifax and St. Johns line-of-steam Railway, both of which must receive the most liberal consideration, experts remarked, that it would be well if the Governor of New Brunswick or some single, the possession of the said being a note of the St. Johns river, by permission, which was the majority could by the Admiralty trade; a small magnificence of harbour of 30 feet will be unfavourable to the United States, the admirably indispensable to the so-called Gulf of St. Johns and Quebec Railway. If property represented by the United States government.

This rock and expensive approach to the British North-West, possessed of the most promising destination, to the enjoyment of new & facilitated commercial & intellectual and social development will make one of the most practical fruits of government that has ever existed, possessed and fostered by the most widely extended and powerful peoples the world has ever seen, should not every branch with unanimous zeal gather, and prove the most powerful incentive to energetic action, enterprise and stimulation *

* I am truly yours,

WM. KELSO.

Kelso Terry Esq.
Chief Eng. Toronto & G. B. Canal,
Toronto.

wondering the very great advantages made by Lord Sydenham, not in the extension in the north-western boundary as well as in the extension of the north-western transportation, so that not shall it never be questioned a fair valuation. Advocate in regard to purchase to Canada, I shall also considered between the St. Louis and Red rivers in the land to Lake Superior.

At last the immense magnitude the population of the North-West is already as distant. Indianapolis, the city of Chicago 120,000. Milwaukee, in produce, placed in thoughtful cities alone, during 18 and years 18,000,000, and yield more of grain & provisions. Lake Michigan, in 18 WHOLE harvests. While there are no more than three Pacific railways projected shooting into the great European highway & a more worthy navigation for 18,000,000, Within many more of land and the labour of 2,000 vessels, would accomplish 18 years in five years. And in many in Canada that is now to supply the 18 branch of such undertaking, that cannot be the Crown lands throughout the line. It should only be done this in how by government. Steamers and canals connected with this is one intersecting part of the country in all roads. Insolvent and embarrassed Speech Month to provide and Monday's more necessary enlightened and liberal policy. Public we all in be able and no superiority of population cannot in from the regions of a this Lieutenant-Governor. in that other and Chief world of interest that the population was not last of the parish of Mayor to Rule, and reverse which of an English settlement, our boasted canals and numerous unpeopled and not public powerfully can occupation and prosperity Blessed to a private trade. which the Thirteen new Province characterized the whole country as a warehouse. Should, however by the establishment in Montreal, Board to Works, and perhaps to the circumstances a part, railroads, in general progress and the political north as immediately endowed, will, at the present period, and consequently of the lower. the same privileges of a large commercial and manufacturing and Mayor prove injustice to any on the whole of this colonies. Thus the Provincial expenses. nor in Lands annuity, the the greater interests of the country, and the Ireland the two dominions the more Province has its thoroughout and the and our material success of which the colonies to Carrington, and not to be entirely ought be opening up, would be by Britain Canada great thoroughfare to Ireland shores, and which will be found as extravagance and Parties in the welfare to the Indian and Majesty's and it is necessary to be system and magnificent of to-wide years to. To which however increasing the confidence to capitalists, and alarming responsible undertaking the most, the great many Provinces more not to be excluded. Portland Parliament and important under grants and party possessions, are to Ireland to the peace and prosperity of a new country as they are beginning to it will be considerable, and should, in its regard to the great men, public and merchants of the people, in the material connect forever subjugated. The many accomplishments dangers I notice with our maritime provinces, the Inter-colonial Railway and Ocean Mail service, while involved in connection with our communication in the North-western territory and the various American navigation railway routes to the Pacific, cannot fail to favourably examine the information in the Imperial Government in which has long been Consideration of the establishing an ex-station period of a regular Packet navigation and it would be an opportune to view the Hudson's Bay Company, constituting their steps internal and intimate investigation in both highly interesting country, to cross in plan, not on the route between of the main Establishments the Establishment is a proof contend only in the North-west, which would Commission be found on by a good military or governmental high road.

APPENDIX C

Meteorological Mean Results at the Toronto Observatory

MONTH.	Mean Barometer at	THERMOMETERS.				MEAN OF THE Hygrom.	RAIN.		SNOW.		Total depth Rain & Snow in inches.	WIND.			
		Mean.	Max.	Min.	Ranges.	Last Quarter of	Days.	Inches.	Days.	Inches.		Mean of Velocity.	Mean of Pressure.	Mean of Horizontal Motion.	Mean Force.
		Deg.	Deg.	Deg.	Deg.	Deg.							Lbs.	Miles.	Lbs.
January	29.4660	24.32	34.25	14.39	19.86	0.82	6	1.665	11	10.4		6.39	0.2	95.1797	0.70
February	29.4660	26.03	36.36	15.71	20.65	0.82	10	2.365	11	9.0		6.24	0.2	93.4767	0.70
March	29.5144	40.86	47.83	33.89	13.94	0.83	10	2.415	12	7.0		6.10	0.2	91.4767	0.70
April	29.5272	47.40	56.93	38.76	18.17	0.75	9	2.355	4	1.0		5.74	0.2	86.1000	0.66
May	29.4660	57.68	70.16	45.54	24.62	0.65	10	2.815	0	0.0		5.39	0.1	80.8500	0.58
June	29.4660	67.46	78.93	56.24	22.69	0.72	9	3.160	0	0.0		4.870	0.1	73.0500	0.48
July	29.4660	71.30	83.16	60.16	23.00	0.75	9	2.815	0	0.0		4.870	0.1	73.0500	0.48
August	29.4660	69.63	81.29	57.98	23.31	0.77	9	3.215	0	0.0		4.777	0.1	71.6500	0.46
September	29.4660	60.60	71.70	49.50	22.20	0.78	8	2.265	0	0.0		4.777	0.1	71.6500	0.46
October	29.5280	49.72	57.99	41.45	16.54	0.80	11	3.354	1	0.5		5.39	0.2	80.8500	0.58
November	29.4660	41.12	47.29	34.95	12.34	0.87	12	3.665	5	3.0		6.24	0.2	93.6000	0.70
December	29.4660	28.79	36.81	20.77	16.04	0.86	11	2.765	10	8.0		6.24	0.2	93.6000	0.70
Mean via	29.4660	48.44	57.71	39.17	18.54	0.79	115	32.705	54	39.0		5.39	0.2	80.8500	0.58
DATE.	Means of 12 years.	Mean of 12 years.	Mean of 12 years.	Mean of 12 years.	Mean of 12 years.	Dew's tables.	Mean of 37 years.		Mean of 37 years.			Mean of 12 years.	Mean of 12 years.	Traditions of 12 years.	Mean of 12 years.

APPENDIX D

GEOLOGICAL DESCRIPTION

By reference to Sir W. Logan's map, illustrating the physical structure of the Western Districts of Upper Canada, it will be observed that the proposed canal, commencing at the Humber Bay situated in the Holland River group, crosses the line of division between that and the Hudson River shale about twenty-three miles from Lake Ontario, and the line of it cuts of the Trenton limestone, thirty-three miles from Lake Ontario, completing the Ridges" to Map Route No. 1 continues in this group to its mouth at the Nottawasaga River

The whole of the proposed route goes through the lower silurian formation consisting as to it is its uncultured portions of route No. 2, which crosses the line of it rises between the lower silurian and Laurentian system of the Geological survey.

Route No. 2 would also commence in the Holland river group, crossing the lines of division of the Utica shale and Trenton groups, forty and fifty miles from Lake Ontario respectively and continuing in the latter group to the mouth of the Nottawasaga River.

In Sir William Logan's paper on the physical structure of the Western Districts, etc., published in the August number (1864) of the Canadian Journal, the position which nature in the locality is as follows

Taking these roads in the general geographical, I will be perceived by the map that the lower silurian series, by a margin in the north-east, towards the south-west, keeps round from Lake Ontario to the Georgian Bay, and proceeds thence by its mouth into of the Manitoulin Islands, and the south shore of Lake Huron to the northern peninsula of Michigan gradually reaching to Green Bay in Lake Michigan. The upper silurian follows them. The Niagara limestone at the base and in forming the rock of Lake separating and holding up Lake Erie and Lake Ontario, and continues in a ridge along the Bruce Peninsula, and the promontory terminating at Cabot Head and Cape Hurd, at which promontory the strata of the Manitoulin Islands is only an interrupted prolongation.

The Hudson river group is separated in front of the our question, were at Toronto, during the lowest lake level, and as he distinctly traced along the basin of the river Humber as far as Eversley, on the south side of the ridges, a distance of three miles, and having an height above of about seventy feet to the lake in this direction on the north side of the ridges we trace of this group has been discovered along the line of survey

On Lot Slip in the Isle of Sheppey is apparently a transitional group, which Prestwich would probably assume forms a member of the Thanetian group. It lies in the area the line of division between Woolwich and the Reading series should be drawn (this rather further west than is indicated on the Geological Map), and the whole of this deposit, somewhat in the manner of Bracklesham Bay, would be an Ypresian group.

As the Thanetian formation, though comparatively thin at Mr. W. Lawrence, it proved to be a very valuable one for economic purposes, the results on which Mr. Lawrence enlarges having been conspicuous in the working of the Chalk with the excavations will be considerably lessened in quantity; and as the Thanetian can be used in the construction of the Docks, a considerable saving of the cost would be effected.

In connection with the information on the following descriptions of the constituents of the Chalk, I refer to the Chalker's Guide's Manual of Geology, page 156, will be interesting to the advocates of this most important subject.

First, the slight deposits of drift, under the surface of the ridges, extending over the Chalk—Clarke's Level—overspread above can be no doubt but that the upper portion of the deposit was connected with the Thanetian Sands" described on the Thanetian group, thereby exchanging the superposition to those of the sand and gravel.

By the hypothesis of such a slow and gradual subsidence of the land, he may account for the fact that almost complete beds of shark's teeth and fish-ear bones, the bodies formations were—a peculiar and favoured portion of rock, a fact by no means satisfying as to imagine, as some think that the pulsating and protecting action was, as a whole, universal in the whole proportion of the ocean.

During the successive diminution of the high and varying altitude, ranging from 1000 to 6000 feet above the level, every portion of the surface would be brought down to the sea, or the level of the ocean, so as to be continually in a water line and thus to a shoal; and at length, after being well levelled by the unending action of thousands of inches, might be made to a depth of several hundred fathoms.

By the constant diminution of land the ocean would recede further and further from the associated formed zones of pebbled and strained rock, and some zones would be left as the ocean receded to be in any proper proved form the heavy and boulders, fresh matters areas would then simply serve as receptacles of sand, and and boulders, dropped from resting on portions as a shoal, matter. Fat all furnished by waters and slowly as manner's, during the formation of the unstratified and unfossiliferous mass to deeper a new the smooth in and throwing of shoals and beaches in still going on elsewhere, upon and near the coast of the sea-river.

If an length diminutions should make and by direction of the movement of the earth's crust be reversed, the matters area exposed to it drift would be nearly reconverted into land.

The tertiary deposit, before emerging, would then be a thanks brought a the of the waters of the ocean, tides and currents, on but its upon portion being partially disturbed would have in materials discharged and stratified. Streams also flowing from the land would in some places throw down layers of sediment upon the silt. In that case, the order of superposition will be first and uppermost, marl, loam, and gravel conformably constituted. Second by an unconformed and unfossiliferous mass, the the west part of much older date than the preceding, with angular remains of with boulders interposed, and, thirdly beneath the whole, a surface of polished and furrowed rock.

APPENDIX E

Magnitude of the Lakes from Duluth's Trip Through the Lakes.

NAME.	Area.	Length in miles.	Greatest Breadth	Average Breadth	Coast Line.	Depth in feet	Elevation above the sea.	REMARKS.
Superior	32 000	490	160	350	1040	1000	600	The Sault Ste Marie Canal connects Lakes Superior and Huron. Plan of the locks, 500 feet long, 70 feet wide, 20 feet lift. Canal can be made a boulevard.
Huron	20,800	250	0	70	700	900	574	
Michigan	11 000	360	85	80	800	900	574	Welland canal connects Lakes Erie and Ontario 26 miles in length. Height above Lake above level.
Michigan	11 000	360	85	80	800	900	574	
Erie	11 000	250	80	38	625	200	544	
Ontario	8 500	180	52	60	420	600	234	
Georgian Bay	5,000	120	50	40	240	300	574	
Simcoe	300	38	18	10	100	180	704	
St. Clair	360	20	25	15	60	6 to 20	568	Area Lost in the Flats, $2,000,000, besides submerged flats each way.
Champlain	1 120	120	18	15	240	54 to 234	60	Chambly and Champlain canals connect the St. Lawrence and Hudson. Size 70 miles and 62 miles long, respectively
Great Bay	1 200	100	30	15	200	100	575	
Nipissing	250	30	18	12	120	unknown	648	

Note.—From Archives issued to Parts the Lake, Lake Superior, 31,856 to 32.
Area Size of the Three St. Lawrence and Lakes. 6,807 "
Navigable tributaries of the St. Lawrence 800 "

NOTTAW

BA

WASAGA
BAY

GLOUCESTER BAY
Gloucester
Hunter Islands
Mount Gloucester
Mount Barrington
Barrington Tops
Barrington Tops Road
Mount Royal
Mount Royal Range
Myall Creek
Bulahdelah
Bulahdelah Mountain
Bulahdelah Road
Forster
Tuncurry
Wallis Lake
Wallis Lake Entrance
Port Stephens
Karuah
Karuah River
Karuah Road
Myall River
Myall Lakes
Myall Lakes Road
Bungwahl
Bungwahl Road
Tea Gardens
Hawks Nest
Hawks Nest Road
Great Lakes
Great Lakes Road
Dungog
Dungog Road
Paterson
Paterson River
Paterson River Road
Maitland
Maitland Road
Raymond Terrace
Raymond Terrace Road
Newcastle
Newcastle Road
Lake Macquarie
Lake Macquarie Road
Wallarah
Wallarah Road
Wyong
Wyong Road
Gosford
Gosford Road
Broken Bay
Broken Bay Road
Pittwater
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Manly
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Parramatta
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Liverpool
Liverpool Road
Campbelltown
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Camden
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Bargo
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Moss Vale
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Yass
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Bathurst
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Orange
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Molong
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Dubbo
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Rylstone
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Kandos
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Cassilis
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Singleton
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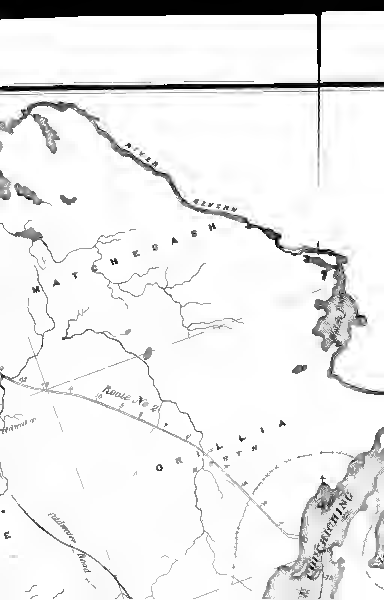
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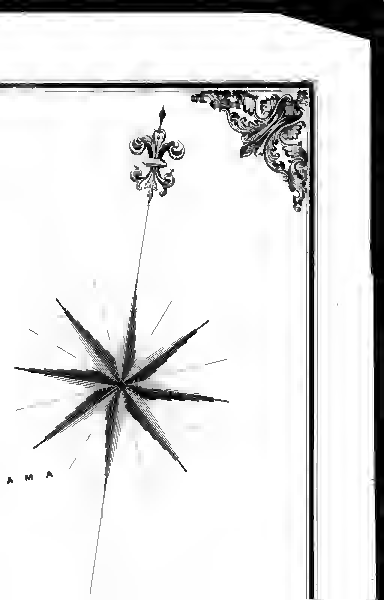

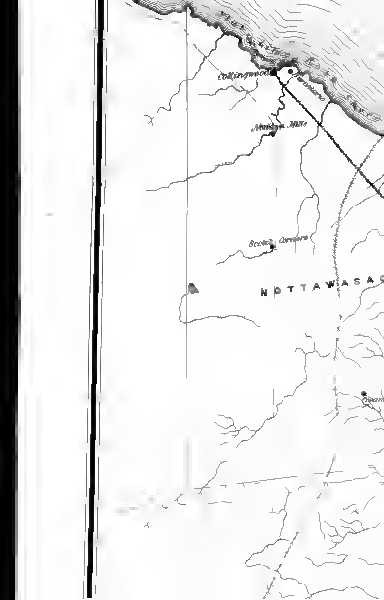
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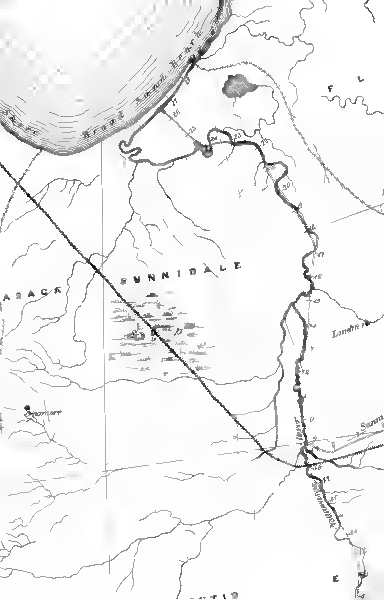
Beaver Harbour
NOTTAWASAGA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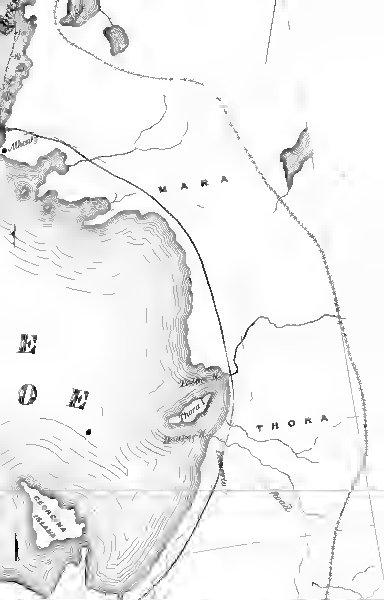
LAKE
SIMCO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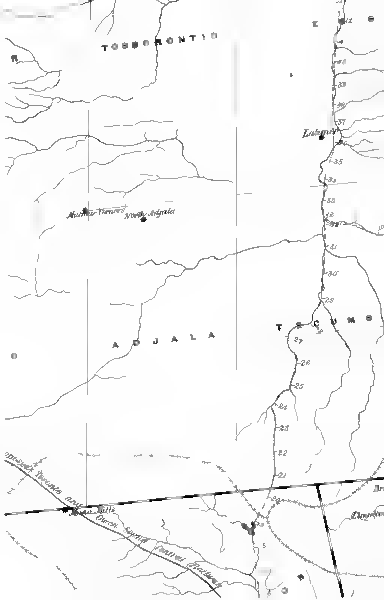
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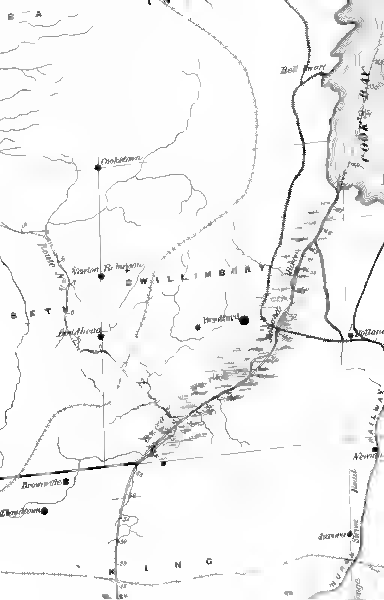
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Keswick
Holland River
Lake Simcoe
Lake Huron
Georgian Bay
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Collingwood
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Port Stanley
Sarnia
Windsor
Detroit
Amherstburg
Leamington
Kingsville
Port Dover
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Whitby
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Prescott
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Smiths Falls
Brockville
Gananoque
Lake Ontario
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Niagara River
Welland
St. Catharines
Niagara Falls
Fort Erie
Port Colborne
Dunnville
Caledonia
Paris
Galt
Guelph
Elora
Fergus
Georgetown
Milton
Oakville
Burlington
Hamilton
Dundas
Ancaster
Waterdown
Grimsby
Beamsville
Jordan
Vineland
Port Dalhousie
Thorold
Welland
Fonthill
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Wainfleet
Port Colborne
Humberstone
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Niagara-on-the-Lake
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Port Dalhousie
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Port Colborne
Humberstone
Chippawa
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Niagara-on-the-Lake

Proposed Extension of G.T.R. to Rice Portage Road
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Stanley Creek
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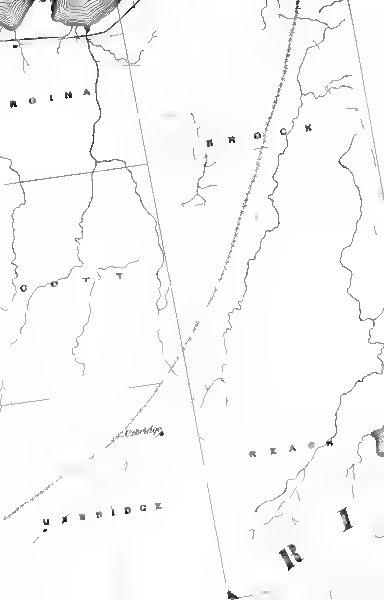
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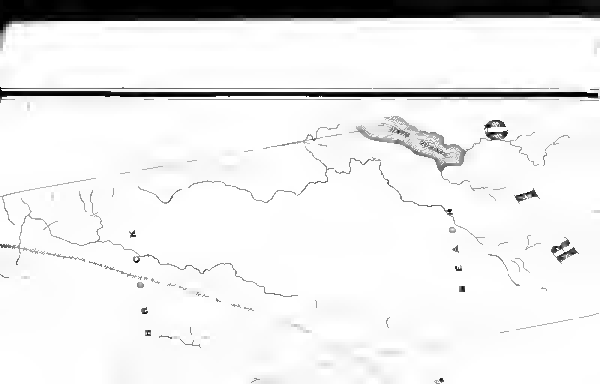
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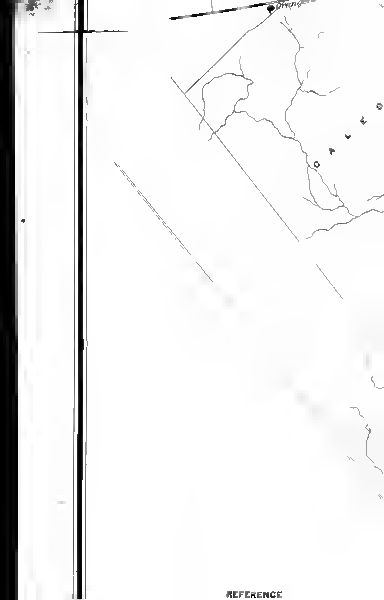
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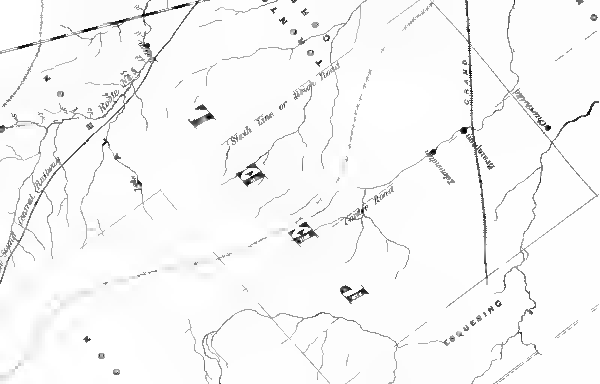
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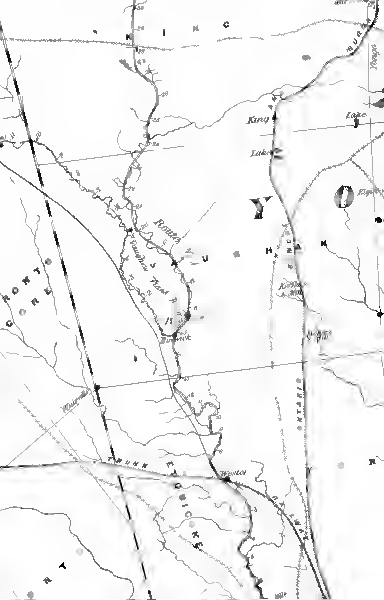
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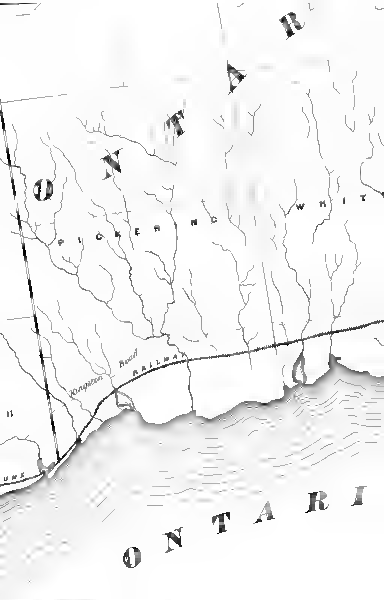
SCARBOROUGH
York Mills
Stouffville
TRUNK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REFERENCE

	CANAL	LAKE
Length of Route / N° 1	71 miles	13 miles
2	65	53
3	63	
4	81	

Lake Simcoe Water Shed 1200 Square miles

Nottawasaga River ... 1000

Humber ... 500

Don 125

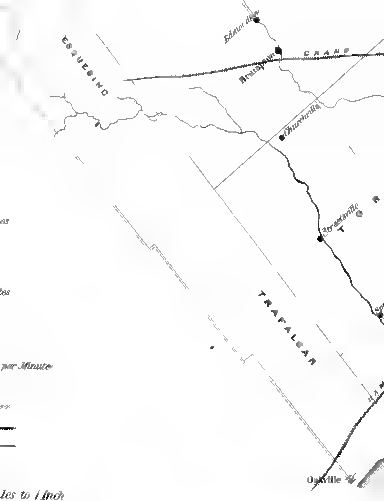
Water Supply from Lake Simcoe 60.000 C^Ft per M
required for the Canal 12.000

Lines of Water Shed Marked thus x x x x x

Railways in Operation

Projected

Scale 2½ Miles to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Brooklyn
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per Minute
ies to 1 Inch

LITHOGRAPHED BY J.ELLIS TORONTO

Shewing th
TORONTO
CITY OF TOR
KIVAS ULLY C E T
and Engineer

ONTARI

MAP

ng the Several Proposed Routes

OF THE

ITO & GEORGIAN BAY

HIP CANAL

Between the

TORONTO & LAKE HURON.

ULLY C.E TORONTO
ef Engineer

R & MASON C.E CHICAGO
Consulting Engineer

N T A R I O

Proposed Routes

ORGIAN BAY

ANAL

the

LAKE HURON.

B. E. MARSH C. E. CHICAGO

Consulting Engineer

E&T
G3523

THE GEORGIAN BAY CANAL

REPORTS

COL. C. B. MASON CONSULTING ENGINEER

AND

KIVAS TULLY CHIEF ENGINEER

APPENDIX [illegible] AND MAP

CHICAGO
DAILY [illegible]

THE

GEORGIAN BAY CANAL.

REPORTS

OF

COL. R. B. MASON, CONSULTING ENGINEER,

AND

KIVAS TULLY, CHIEF ENGINEER,

WITH AN

APPENDIX, PROFILE, AND MAP.

31522
11 7 35

CHICAGO
DAILY PRESS BOOK AND JOB PRINT 43 CLARK STREET
1868.

REPORT.

To GEORGE SIMS, THOMAS RICHMOND, *and* WILLIAM KNOX
Committee of Toronto Convention, held Sept. 12th, 1855

GENTLEMEN—In compliance with your request, I visited Canada in the fall of 1850 and examined the proposed route of the Toronto and Georgian Bay Canal, in company with KIVAS TULLY Esq., of Toronto, who had then just commenced its survey

In the examinations made at that time, several routes presented apparent facilities for construction nearly equal and in view of the great importance of the project, it was deemed essential to make a more extended survey of the country than was at first contemplated.

Mr Tully has since devoted much time in a careful and thorough examination of four different routes, and the results he presents in his able report, published herewith.

Mr Tully has so fully discussed all the points relative to the construction of the canal, that I beg to refer to his report for information on that head.

I propose to present in this report

First—The distances by lake canal and river, between Chicago and New York and Chicago and Quebec, by each existing and contemplated route.

Second—Cost of transportation by each route, in vessels of different sizes.

Third—Cost of the canal, tonnage and revenue with the prospective increase from year to year

Fourth—Extent of country tributary to the canal climate agriculture and mineral resources, extent of country now under cultivation present population railway progress, etc

Fifth—Conclusion

1st. *The Distances by Lake, Canal and River.*—The following table of distances has been made up from the most reliable information I could obtain by the examination of charts, and by consulting navigators now resident in Chicago. It will be found to vary from the table prepared by Mr. Tully or from estimates heretofore made. The variation is mainly between Chicago and Buffalo, which has heretofore been computed at 1,100 miles. This distance no doubt, has been made up from the coasting distances, which has been the route taken generally by vessels heretofore

But it is believed that a vessel starting from Chicago and taking the most direct route through the lake, would not necessarily have to go more than 918 miles to reach Buffalo.

Wherever the St. Lawrence river forms a portion of the route, it has been included under the head of lake as being a navigation not materially more expensive than the lake.

The length of the canals on the routes to New York includes the distance to Albany and is the actual length in all cases except by the Toronto and Georgian Bay route

The whole distance in this case from Lake Huron to Lake Ontario 109 miles is called canal whereas 23 miles of it is through Lake Simcoe, and from 15 to 20 miles is what might be termed slack water navigation having a large extra width really reducing the distance of actual canal to about 60 miles.

The explanation is due to the Toronto and Georgian Bay route, although in making up the cost of transportation it was deemed advisable to call the entire length a canal.

Comparative Distances of the existing and proposed Routes from Chicago to New York.

ROUTE.	Lake.	Canal	River	Total
Chicago *via* Buffalo to New York.	818	364	145	1455
" Welland Canal and Oswego to N York	1043	287	145	1425
" Georgian Bay Canal and Oswego to New York	686	306	146	1138
" Welland Canal and Lake Champlain to New York.	1068	167	246	1881
" Georgian Bay Canal and Lake Champlain to New York.	1041	239	146	1388
" Ottawa Canal and Lake Champlain to New York.	936	816	146	1896

Comparative Distances of the existing and proposed Routes from Chicago to Quebec.

ROUTE.	Lake.	Canal.	River	Total.
Chicago via Welland Canal and St. Lawrence to Quebec	1401	69		1470
" Georgian Bay Canal and St. Lawrence to Quebec	1065	141		1184
" Ottawa Canal and St. Lawrence to Quebec	976	200		1176

2d *Cost of Transportation.*—In making up these tables it has been assumed that there would be no transhipment at Buffalo and Oswego but that the Erie and Oswego Canals would be enlarged to the dimensions now proposed for the Erie Canal and that on all the other routes such improvements would be made as to enable the same vessel loading at Chicago to deliver her cargo in New York or Quebec and on the route where no transhipment occurs the price by river is computed the same as by lake

This difference in the cost of transportation in small and large vessels is only intended to be approximate, the actual result would no doubt be still more favorable for the large vessel

FROM CHICAGO TO NEW YORK

ROUTE.	Miles in lakes.	Miles in canals.	Miles in rivers.	RATES OF TOLLS PER MILE.			Trans-ferred cargo.	Total.
				Lake.	Canal.	River.		
265 ton vessel Buffalo & Erie Canal	915	364	146	8	8	8	40	$6 46
450 " "	915	364	146	5⅝	8	8	40	7 35
800 " "	915	364	146	3⅝	8	8	40	6 03
700 " "	915	364	146	3⅝	8	8	30	5 59
1000 " "	915	364	146	2	8	8	30	5 87
300 ton vessel Welland Canal & Oswego	1065	287	146	8	8	8	40	5 56
450 " "	1065	287	146	5⅝	8	8	40	5 86
800 " "	1065	287	146	3⅝	8	8	40	5 24
750 " "	1065	287	146	3⅝	8	8	30	5 09
1000 " "	1065	287	146	2	8	8	30	4 82
300 ton vessel Geo'n Bay Can. & Oswego	895	200	146	8	8	8	40	5 20
450 " "	895	200	146	5⅝	8	8	40	5 16
800 " "	895	200	146	3⅝	8	8	40	4 91
750 " "	895	200	146	3⅝	8	8	30	4 84
1000 " "	895	200	146	2	8	8	30	4 47

FROM CHICAGO TO NEW YORK

ROUTE.	Lake in miles.	Canal in miles.	River in miles.	RATE IN MILLS PER MILE. Lake.	Canal.	River	Total.
300 ton vessels Welland Canal and Lake Champlain	1582	167	147	3	6	4½	$5 89
400 " " " "	1582	167	145	2½	6	3	5 36
600 " " " "	1581	167	145	2½	6	3	5 16
700 " " " "	1584	167	145	2½	6	3	4 83
1000 " " " "	1580	167	145	2½	6	3	4 48
300 ton vessel Georgian Bay Canal and Lake Champlain	1011	289	145	3	6	4½	6 36
400 " " " "	1011	289	145	2½	6	4½	6 06
600 " " " "	1011	289	145	2½	6	3	5 93
700 " " " "	1011	289	145	2½	6	3	5 73
1000 " " " "	1011	289	145	2½	6	3	4 29
300 ton vessels Ottawa Canal and Lake Champlain	826	316	145	3	6	4½	7 64
400 " " " "	826	316	145	2½	6	4½	7 38
600 " " " "	826	316	145	2½	6	3	5 13
700 " " " "	826	316	145	2½	6	3	4 96
1000 " " " "	826	316	145	2½	6	3	4 69

CHICAGO TO QUEBEC

ROUTE.	Lake in miles.	Canal in miles.	River in miles.	RATE IN MILLS PER MILE. Lake.	Canal.	River	Total.
300 ton vessels by Welland Canal	1461	69		3	6	4½	$4 73
400 " " " "	1461	69		2½	6	4½	4 46
600 " " " "	1461	69		2½	6	3	3 93
700 " " " "	1201	69		2½	6	3	3 70
1000 " " " "	1201	69		2½	6	3	3 35
300 ton vessels by Geo'n Bay Canal	1048	141		3	6	4½	$4 28
400 " " " "	1048	141		2½	6	4½	4 01
600 " " " "	1048	141		2½	6	3	3 48
700 " " " "	1048	141		2½	6	3	3 28
1000 " " " "	1048	141		2½	6	3	2 93
300 ton vessels by Ottawa Canal	976	300		3	6	4½	$4 53
400 " " " "	976	300		2½	6	4½	4 23
600 " " " "	976	300		2½	6	3	3 64
700 " " " "	976	300		2½	6	3	3 39
1000 " " " "	976	300		2½	6	3	3 05

CHICAGO TO LIVERPOOL.
Per 1000 Tons Measure.

Chicago *via* Buffalo to New York	$3 97	
New York to Liverpool 3289 miles at 1¼ mill	4 47	
		$10 94
Chicago *via* Welland Canal and Oswego to New York	$4 82	
To Liverpool	4 47	
		9 29
Chicago *via* Georgian Bay Canal and Oswego to New York	$4 67	
To Liverpool	4 47	
		9 14
Chicago *via* Welland Canal and Lake Champlain to New York	$4 48	
To Liverpool	4 47	
		8 95
Chicago *via* Georgian Bay Canal and Lake Champlain to New York,	$4 92	
To Liverpool	4 47	
		9 39
Chicago *via* Ottawa Canal to New York	$4 60	
To Liverpool	4 47	
		9 07
Chicago *via* Welland Canal to Quebec	$3 35	
To Liverpool, 2803 miles at 1¼ mills	3 75	
		7 10
Chicago *via* Georgian Bay Canal to Quebec	$3 32	
To Liverpool	3 75	
		6 97
Chicago *via* Ottawa Canal to Quebec	$3 35	
To Liverpool	3 75	
		7 10

3d. Cost of the Canal, Tonnage and Revenue.—Of all the routes surveyed by Mr. Tully, Route No. 1 presents the most favorable features and is the one that is recommended. This route commences at the mouth of the Humbee river and passes through Lake Simcoe terminating at the mouth of the Nottawasaga river on Lake Huron. I entirely concur with Mr Tully in his views of these terminal points. By reference to the profile, it will be seen that the ascent from Lake Ontario to the summit is quite uniform and gradual admitting of a series of combined locks as shewn on the profile, or in some cases of single locks with sufficient space between them for passing vessels

The combined plan gives larger reaches between the locks and has some advantages in that respect for towing vessels. But these advantages are more than counterbalanced by the delay that must necessarily occur by such an arrangement of locks unless they are double locks, particularly when the canal is worked up to near its full capacity

Wherever it was practicable, therefore, I should advise the single lock with sufficient space between for the convenient passing of vessels, or, when combined, that they should be constructed with a view to adding a double lock at a future day. No work of a difficult character presents itself until we reach the summit level, where we encounter a cut of nearly 200 feet at the deepest point, averaging about 90 feet for nearly ten miles. This is probably a larger and more extensive cut than has ever before been encountered on any public work, but the examinations so far as made, do not show any thing insurmountable in its execution. Such allowance has been made in the estimate for contingencies as seemed necessary from all the information that has been obtained. It would be desirable, however as this is the only serious obstacle, to have a more thorough examination made at this point with a view to ascertain with more certainty the quality of material to be encountered in making the cut.

The navigation through Lake Simcoe is favorable with a sufficient depth of water for safety.

The cut between Lake Simcoe and the Nottawasago river averages about 60 feet for several miles, but there is nothing that indicates anything unfavorable or very formidable. From its entrance into the Nottawasago Valley to the western terminal point it is exceedingly favorable, except a short cut near the lake. The most part of this distance would be a very considerable extra width of water surface, affording a fine navigation. The Nottawasago river for some four miles from its entrance into the lake runs nearly parallel with the lake and is from 300 to 600 feet wide, with an average depth from 10 to 12 feet water, and at a very small expense may be made a perfectly safe harbor for a very large number of vessels.

Mr Tully's estimate for the route described is	$23,170,750
Six per cent interest on this sum would be per year	1,390,245
For repairs and maintainance of the canal, say $1000 per mile or per year	100,000
	$1 490,245

In order to pay 6 per cent. on its cost and maintain it, we require an income of $1 490 245 : will the country tributary to it afford a business that will justify this expense for its accommodation? By referring to what has been done in times past we may draw conclusions for the future

In Messrs Parkinson and Smith's report on the St. Clair, Chatham and Rond Eau Ship Canal, they estimate the total tonnage passing St. Clair flats in 1855, between the ports of Chicago, Milwaukee Toledo, Cleveland, Buffalo Oswego, and Ogdensburg, at 2 385 516 tons. Taking into account the smaller ports on the lake it will be safe to call the tonnage in 1855, 2 500 000. I am confirmed in my opinion that this amount is not over estimated, by consulting the very able report of Col J. D. Graham, U S. Army on the commerce of the lakes, and various other authorities.

In the very valuable reports of John B. Jarvis, Esq., on the Cayughnawga Canal, and of William J McAlpine Esq., in 1853, then State Engineers of New York, I find that Mr Jarvis estimates that the tonnage from 1850 would be doubled in six years and quadrupled in fifteen years, and that the total movement to and from ports water in 1868 from and to ports west of Buffalo would be 9,000,000 tons. Mr McAlpine estimates the movement on the Erie Canal in 1862 at a little more than 9 000 000 tons allowing the same rate of increase as estimated by Mr Jarvis would very soon work the canal up to its full capacity in its enlarged state

Assuming then the tonnage that passed the St. Clair flats in 1855 to have been 2,500 000, and allowing one third of this amount for the business between the ports and Lake Erie and ports north and west of the St. Clair flats, we have left 1 666,667 tons as the amount that would probably have passed through the Georgian Bay Canal had it been completed in 1855 I assume as the rate of increase 25 per cent for every five years. The reasons for this are particularly set forth in another part of this report. And assuming the tolls on the canal to be four mills per ton per mile or forty cents per ton, we have the following results

Year	Total Tonnage.	The portion of Tonnage that would pass the Canal.	Tolls.
1855	$ 2,500,000	1,666 667	
1860	2,700,000	1 900 000	
1865	3,375 000	2 185,666	
1865	4,725 000	2 812 665	1,125 066
1870	5,400,000	3 420 794	1 482 817
1875	7,031,895	4,567,895	1 846 697
1880	7,875,000	4,912 698	2,033,196
1885	11,250,000	7,324 615	9 065,899
1890	12 094,210	8,848 156	3 339 104
1895	19,471 500	10 794 656	3 081 696

This canal, if commenced soon and prosecuted with the energy it should be, may be in successful operation in 1866. We commence then with a business nearly equal to six per cent. on its cost, with a certain prospect of a rapid increase.

The further trade I have not considered in my estimate of the tonnage. The letter marked "A" (see Appendix) from H. K. A. Boys, Esq., of Barrie, Canada, will give an idea of what may be expected from that source.

EXTENT OF COUNTRY TRIBUTARY TO THE CANAL.

In this, as in other portions of this report, the reader is requested to place before him any good map of North America. It will be seen that the great central valley of the continent, lying between the Allegheny and the Rocky Mountains, stretches from the Gulf of Mexico to the Arctic Ocean. This magnificent valley—for there is no chain of mountains east and west to divide it—is drained to the south by the Mississippi, to the east, by the St. Lawrence to the Atlantic, and by the Severn, Nelson's and other rivers, into Hudson's Bay and to the north by Mackenzie's river, which empties into the Arctic Ocean. The great controlling streams of commerce have always followed the lines of longitude, and it needs no argument to shew that the trade of the central portions of this vast valley—the largest and the richest upon the globe—must flow east and west through the lakes and the valley of the St. Lawrence. The north and south traffic upon the Mississippi and its tributaries will ever be large and important, but, as compared with the commerce upon the lakes, and eastward through the Erie canal and the St. Lawrence to the ocean the trade upon the Mississippi must ever fall far below, both in bulk and value that upon the lakes and the St. Lawrence.

It will be conceded at once that the Georgian Bay Canal will be a competitor for the trade with those eastbound of all the country east of the Rocky Mountains and west and north west of the south eastern point of Lake Michigan. By the Illinois Central Railroad wheat is brought from the southern counties of that state to the Chicago Market, and it will be certainly safe to say that the

lake route will attract the trade as far south as the latitude of Alton Drawing a line, therefore, east and west through Alton and extending it to the Rocky Mountains, we shall have within the bounds of the United States, east of the Rocky Mountains and west of Lake Michigan, 700,000 square miles territory enough to form fourteen states as large as Ohio. There is much more territory than this but it is intended only to embrace that which is valuable and available for settlement and profitable cultivation The report of H U Hind Esq Naturalist and Geologist of the recent Canadian expedition to the Red River of the North gives the amount of territory available and valuable for settlement, north of the boundary of the United States, and drained by the rivers flowing into Lake Winipeg, at 400,000 square miles It is safe to say therefore, that the commerce of 1,100 000 square miles of the great central valley of the American continent, would be tributary to the Georgian Bay Canal It has been stated by men whose judgment is worthy of respect at 2,000 000 of square miles, but we prefer to be far within rather than beyond the true estimate This vast territory is equal to one third of the entire area of the United States and, Russia excepted, is not by equal to that of all Europe combined.

COMMERCIAL FACILITIES

To illustrate this topic by particulars would require a much larger space than the limits of this report will permit. The magnificent chain of lakes extending west far away towards the center of the continent, and affording nearly all the advantages of ocean navigation, is a most wonderful provision of Providence to promote the commercial and hence the social, welfare of the millions who are soon to inhabit this valley So gentle are its slopes that the large rivers which drain it into the Gulf of Mexico and Hudson s Bay the Mississippi and its tributaries, and the rivers flowing into and draining Lake Winipeg are navigable for steamers for thousands of miles No country in the world presents a finer field for railway enterprise, and as it fills up with a vigorous industrious intelligent population these advantages will be fully appreciated and improved.

CLIMATE.

The climate of that portion of the territory in the United States that would be tributary to the Georgian Bay Canal belongs to the most healthy and inviting portions of the temperate zone. It is the range which, in all ages of the past, has nourished the most populous and powerful empires, and that such is the "manifest destiny" of the country under consideration all who have studied its character and resources have entire confidence. Of the 400 000 miles of territory in the valleys of the Red River of the North the Assiniboin the Saskatchewan and surrounding Lake Winnipeg recent investigations have shown that its climate is well adapted to promote the health and the vigorous development of the human family. Mr Hind whose report is referred to above, says that "all the necessaries of life are found in the Red river valley. All crops cultivated in Canada succeed well and often show an average yield far in excess of Canadian returns. The climate of the agricultural season is well adapted to all the operations of husbandry." Corresponding observations show that the summer temperature is three or four degrees warmer than at Toronto. The winter climate, he adds, "is very severe." Though severe all experience has proved that the winter is lasting and not unfavorable to the ordinary out-door operations of the season in southern latitudes. The recent large and elaborate work of Prof. Blodgett on climatology has proved that the climactic lines when they pass west of Lake Superior, bend far away to the north; and this eminent climatologist gives it as his well matured opinion that the climate of the region under consideration is highly favorable to the development of a great, prosperous and powerful people.

AGRICULTURAL RESOURCES.

In agricultural resources it is conceded by all who understand the subject that no portion of the globe, of equal extent, contains so rich a soil, or so many elements of all that can contribute to

the physical comfort and the social elevation of man. All the cereals are produced in great abundance, fruits of all kinds common in corresponding latitudes are matured in the greatest perfection, and horses, mules, cattle, sheep, swine, poultry and all the domestic animals, are produced in the greatest abundance. If fully developed there can be no question whatever that the soil of this vast region would support a population as dense as that of any other portion of the globe and afford the means for the highest physical, intellectual and social development. Should we speak by particulars, and give figures and estimates, from well known facts as to its productive capacity they would appear more like the extravagant musings of a vagrant imagination than the deductions of sober matter-of-fact reality.

MINERAL RESOURCES.

COPPER.—Both in extent and richness the copper mines of Lake Superior are without a rival. The actual figures showing the size of masses of native copper found in the Minnesota, the Cliff and some of the other mines appear absolutely fabulous. There are hundreds of square miles on the south shore of Lake Superior whose strata are filled with copper, and an abundance of this metal is found there to supply the world for ages to come.

IRON.—The reputation of the Lake Superior iron as among the very best in the world is now generally established. Mountains of this essential element of civilization exist there, sufficient alone to supply the entire continent for an indefinite period in the future. It is also found in Illinois, Wisconsin, Iowa and Minnesota, in some districts in great abundance. Facts are not wanting to prove its existence in that part of the British possessions under consideration and in some portions it is believed that it will be found in large quantities.

COAL.—Illinois contains one of the largest and ere long it must become one of the most productive coal fields in the world. It also extends into Iowa and exists there in large quantities. In relation to the northern portion of the territory under consideration in the United States, and that which is embraced in the

British possessions the following facts are quoted from an able and most valuable lecture on "The Undeveloped Northern Portion of the American Continent," delivered before Bell's Commercial College, Chicago, February, 1856 by JOHN L. SCRIPPS, Esq. editor of the CHICAGO DAILY PRESS. The lecturer (page 17) says

"I remark in the next place upon the existence of coal in a large portion of the country. Frumtheze and Gov. Simpson speak of its outcropping at different places on the Saskatchewan. Lyons and Clark saw bituminous coal between Fort Clark and the falls of the Missouri River. Collections also saw coal on the same localities. Wyeth saw large quantities of it on the Tellowstone. Gov. Stevens' party found the whole country from the falls of the Missouri westward to the mountains, one by five hundred miles, underlaid with lignite. Boe ne ville speaks of regions among the mountains near the head waters of the Yellowstone which abound in anthracite coal. In fact, coal has been traced along the 47th parallel of latitude for a distance of nearly ten degrees of longitude with a southern outcrop, rendering it more than probable when considered in connection with the discovery of coal in the Saskatchewan, the Athabasca, Mackenzie's River and Great Bear Lake that a coal field of greater extent than any other in the whole country in a since hill of the Rocky Mountains, is the discovery of coal nearly all around the northern rim of the North American continent by the captains of whaling vessels, and by the hardy explorers who have tempted the Arctic seas in search of a north-west passage by the presence of both coal and lignite in Greenland upon Disco Island and upon the Faroe Islands, off the coast of Scotland—thus imitating the wonderful economy of nature, or rather the existence a beneficent Providential design, by which regions destitute of timber are supplied with an easily accessible fuel."

LEAD.—The extent and the resources of the Galena land district are already very generally known. As in the magnitude of her lakes and rivers, so in the bestowment of her mineral treasures in this vast country, Nature has distributed with a most bountiful hand. There is here enough and to spare of this valuable mineral for all the people that can ever find a home upon the American continent.

In summing up the mineral resources of the northern portion of the American continent, Mr. Scripps, in his lecture above quoted, says

"The most extensive systems of salt springs and lakes about us in this region, in different localities, both within the American and the British Possessions, and in some districts the mineral itself is found in great purity and abundance.

Considering the vast amount of minerals already discovered with scarcely any scientific exploration, the hypothesis is by no means unreasonable that, but no portion of the continent exceeds this vast undeveloped north west in mineral resources."

EXTENT OF TERRITORY NOW UNDER CULTIVATION

It is impossible to estimate with any certain approach to accuracy, the amount of this vast region that is now actually under cultivation. The rapidity of the growth of the North west has so far exceeded all former ratios of increase that one scarcely dares to believe the figures when the census returns show the acknowledged results from one decade to another. In 1850 the amount of land in that portion of the United States now under consideration which was then under cultivation, as shown by the census returns was as follows:

Illinois,	3,069 644
Wisconsin,	1 045,469
Iowa,	324 612
Minnesota,	5,015
Total	4 324 781

This is an area of 18,304 square miles, only about one-fifth of the area of the State of Illinois. Since 1850 we have no returns to show the amount of land brought under cultivation, but the statistics of population as will hereafter appear show an increase of 85 per cent. in five years, from 1850 to 1855, in the states above named; and the increase for the same period in these states, and Indiana, Ohio and Michigan show a gain of 29 per cent. With the ratio of 29 per cent., there would be 5 930 041 acres under cultivation in 1858, and at the close of 1857, 5 854,765 acres, equal to 15 884 square miles.

PRESENT POPULATION.

And its probable increase, and also that of the lands brought under cultivation, Commerce, etc.

The population of the district in the United States, now under consideration, in 1850, 1855, 57, as derived from the government and state census, and other sources, was about as follows

	1850.	1856	1867
Illinois,	851 470	1 600 000	1,500,000
Wisconsin,	305,391	561 109	650,000
Iowa,	192 214	346 956	580,000
Minnesota,	6,077	40,000	200,000
Nebraska,		4 000	60,000
	1 356,162	2,541 944	3,070,000

These figures, as above stated, show an increase from 1850 to 1856, of some 65 per cent, but if the States of Ohio, Indiana and Michigan be added to the above as they are commonly included in speaking of the North west, the ratio is brought down to 39 per cent. which we prefer to take as a basis for future calculations. Taking these figures as the ratio for thirty seven years, which is a fraction more than the average lifetime of a generation, we present the following table, showing the probable increase of population and the amount of lands to be brought under cultivation for every five years, from 1856 to 1886

From the very able and valuable report of Col. J D Graham, U S. Army on the commerce of the lake ports for 1855, we find that the total value of the commerce of Chicago and Milwaukee which passed over the St. Clair Flats for that year, was $136 304,692.72 Adding only the value of the commerce of Milwaukee for that of all the other ports on lake Michigan, we shall have $159 108 180.55 as the total value of the commerce from lake Michigan which passed over the St. Clair Flats in 1855

POPULATION, COMMERCE, TONNAGE ETC

The following Table shows the Present Population amount of Land now under Cultivation, Commerce of Lake Michigan which would be tributary to the Georgian Bay Canal, or for which it would be a competitor Estimated Revenue with the Tonnage and Cost of Freight, on Vessels which passed over the St. Clear Flats in 1855, with their Probable Increase for thirty-seven years at the rate of 20 per cent for every five years—29 per cent. being the Ratio of the Increase from 1850 to 1855 of the Population of the States commonly included in the term North West, viz Ohio, Indiana, Illinois, Michigan, Wisconsin Iowa, and Minnesota.

	1850.	55?	1860.	1865	1870	1875	1880.	1885.	1890.	1895.
Population	2 977,154	3,570,709	4,604 195	5,985,838	7,611 715	7 797 858	9,890,771	12,519,369	16,099,214	21,455,095
Then number of acres of land under actual cultivation	8,930,241	10,704 709	13,809,586	17,957,462	22,835,145	23,393,574	29,672,314	37,558 108	48,297,642	64,365,285
Total of hundred feeted in square miles.	46,971	52,556	58,340	68,356	70,387	89,086	89,086	89 986	84,180	103,564
Amount of said remaining to which period to be cultivated in square miles	1,566,000	1,564,646	1,691 940	1,679,444	1,709,613	1 691,309	1,669,080	1,664 787	1,615,980	901,646
Value of the tonnage of Lake Michigan passing n or St. Clair Flats.	$103 120,120	77,500,720	108,462,307	203,916,915	286,99,807	447,203,850	627,307,020	744,490 781	980,453,960	1380 989,938
Tonnage passing St. Clair Flats in 1855, with its probable in increase	1,600,960	2,720,000	3,978 400	4 998,988	6,663,840	9,661,568	9,979,453	13 960 985	19,094,190	19,471,068
Estimated amount of Tonnage that would pass through the canal	1,440,864	1,960,000	3,180,320	4,518,952	6,096,764	6,567,168	8,913 906	9,984,819	1,940,136	11 704,695
Estimated revenue for the canal,				1,136,738	1,659,017	1,680,897	2,247 785	2,252,658	3,985,534	6,081,185

Let us discuss the facts contained in this table for a few moments and first, as to population. It may be said that the ration of twenty-nine per cent will not be continued through thirty-seven years. As above stated, the ratio of the increase of population in the territory west of Lake Michigan for the last five years, has been sixty five per cent.—more than twice the figures from which our results are derived.

Take another fact. The census returns show that the entire North-west, embracing Ohio Indiana, Illinois, Wisconsin with the addition now of Iowa, Minnesota and Nebraska, in 1820 contained 782 710 inhabitants in 1857—the same period on which our results are based—they contained, in round numbers, 7,950,000 people—an increase in a little more than the average into time of one generation of EIGHT HUNDRED PER CENT. With railways and telegraphs, and magnificent steamers on lake and river, and withal the knowledge of the agricultural and mineral wealth of this vast country the beauty and magnitude of its prairies and the salubrity of its climate now matters of daily conversation and newspaper comment in every person of the civilized world who shall say that the increase of population in this brand favored land will not equal in the next thirty-seven years the results of the same period in the past. Leaving out Ohio Michigan and Indiana, that ratio would give, west of Lake Michigan in 1895 within the territory of the United States, north of the latitude of Akron and east of the Rocky Mountains a population of 24 350 000. This result is truly amazing, but it is not more wonderful than what a large proportion of those now living both in the United States and in Canada, have themselves seen and realized. Take still another illustration. The old northern States proper have increased in the last thirty seven years in the ratio of eighty two per cent. It has been proved from the statistics of our railways for the past few years, and other sources, that about 250,000 people have annually emigrated into the country west of Lake Michigan. Apply the ratio of the increase of population of the old States to those already in the territory under consideration and half the ratio for half the time to this stream of human energy that is constantly flowing into it, and we still have in 1895 a population of 16 787 000 It is therefore deemed a moderate estimate to say that the portion of territory in the United States that is tributary to the Georgian Bay Canal will contain, only thirty seven years hence, a population of at least TWENTY MILLIONS OF SOULS.

The question next in order is, what will be the population of the territory under consideration that is within the British possessions? There are no facts within our reach to show what the present population of the valley of the Red River of the North, and at the trading posts of the Hudson's Bay Company, is; but several thousands, it is believed, are already there. Any calculations, however, based upon their probable increase, would fall far within the mark. For scores of years the Hudson Bay Company have kept the world in ignorance as to the extent and the richness of the country lying north and west of Lake Superior, using all the means in their power to strengthen the conviction that it was a cold, inhospitable region, only for the residence of Indians and trappers, and this with animals which are furs were the only productions of this vast territory that could be made available for civilized man. The gigantic monopoly of this company is now, or soon will be, broken; the ignorance which it so industriously fostered, is now dissipated and the people of Canada and Great Britain will assert their right to emigrate to and settle in this vast rich, and inviting region. An immense stream of active, intelligent and enterprising men will ere the next decade shall have passed away, be pouring into it from Canada, England Ireland and Scotland, and by the year 1895 the foundations of a great and prosperous empire will be laid there. Not being even the most a moderate estimate, from one to two millions of people. It may be asked in general, and it is certainly a pertinent question, where all these people to settle that portion of the United States and the British possessions are to come from? We answer. They will be the intelligent the enterprising and the vigorous sons and daughters of Canada and the older states of the American Union. Immense names will be put in commission to transport to this favored land the same class of emigrants from England Ireland Scotland France, Holland Germany, and nearly all the other kingdoms and empires of Europe. Where land is cheap, the soil rich and productive the climate inviting and withal the government free and stable and life and property secure, there will the intelligent millions of our race congregate for the next half century.

Let us canvass next the amount of land likely to be brought under cultivation. It may have been noticed in this, as in regard to population that the whole of Illinois is included in our calculations but about half the state of Missouri lies north of the latitude of Alton and having no means to divide either state, if the

southern section of the one be taken for the northern section of the other, the results will be sufficiently accurate for all practical purposes. The amount of territory likely to be under cultivation in the different periods, as stated in the table is far too low. It is much too small a view. The population of the territory under consideration increased from 1850 to 1855 in the ratio of sixty-five per cent., instead of twenty-nine, the element used in the preparation of the table. There can scarcely be a doubt that there was twice as much land under cultivation in 1857 in Illinois Wisconsin, Iowa and Minnesota, as there was in 1850. We shall be disappointed if the census returns of 1860 do not show an increase of three hundred per cent. since 1850. At that time there were 6,914 781 acres under actual cultivation, as shown by the United States census. An increase of three hundred per cent. would give us 1860 20 744 282 acres, or 32,413 square miles, and not 18 360 as shown in the table.

We must wait for the result of the census of 1860, to learn the actual amount of land which the hardy sons of the west shall have brought under cultivation, but the figures which exhibit the commerce of the lakes, as shown by Col. Graham's report above referred to, and the statistics of the commerce of Chicago for the past few years as proved by the able and carefully prepared statistical articles of the Chicago DAILY PRESS afford one of the most important subjects of study to be found in the annals of modern commercial progress. Thirty years ago the commerce of Lake Michigan was merely nominal, confined to an occasional visit of a small government vessel with supplies to the forts in the adjoining territories. In 1856, its value, as deduced from Col. Graham's report, was $749 109 131. To be more particular, we present the following table, showing the receipts and shipments of grain at the port of Chicago for the last four years:

TOTAL RECEIPTS.

	1854.	1855.	1856.	1857.
Wheat, bush.	8,289,958	7,426,697	8,797,780	12 264,211
Corn	7,490,733	5,803,377	11,888 193	7 600,150
Oats	4 106,362	2,947 164	2 918,597	1 797 266
Rye	87,641	68 684	45,707	87,271
Barley	201 744	201 838	136 467	122 858
Total	19,911 548	16,356,760	23,000 319	16,884,756
Flour bbls wheat	792,870	1 203,416	1 654,605	1 949,970
Total	13 804,429	20 467 883	24 974,894	21 365,606

TOTAL SHIPMENTS.

	1854.	1855.	1856.	1857.
Wheat, bush.	2 906,755	3 388,165	3,331,420	3,488,052
Corn	6,347,890	7 812,893	11,126,561	8,814,811
Oats	1,324,987	1,977,588	1 014,563	419,178
Rye	41,107	19,218	699	
Barley	148,631	92,013	16,041	17 788
Total	13,364,188	19,816,716	20,501,275	16,764,629
Flour into Wheat	838,116	617,987	1 081 946	1 798,349
Total	12,499,339	19,498,319	21 583,221	18,562,979

The following table of the receipts of lumber, shows the steady and wonderful growth of that trade for the last eleven years:

	Lumber, ft.	Shingles.	Lath.
1847	33,113 936	10 149,500	3,561,700
1848	50,000,000	20,000,000	10,000,000
1849	72,000,000	38,000,000	12 000,000
1850	100,284 778	84 432 700	16,809,000
1851	126 086,437	60,828 200	22 882,470
1852	147 816 333	77 060 000	18,320,000
1853	203,101,093	86,489,784	26,134,110
1854	239 336 733	98,061 200	33,491 650
1855	316,239 402	128 770 980	46,487,500
1856	408 976,189	133 376,600	70,236 100
1857	459 638,198	161 673,250	80,180,000

The following table shows the number of arrivals at the port of Chicago in 1857, with the tonnage and number of men

Number and Tonnage of vessels arrived at the Port of Chicago for the Season of 1857

	Steam.	Propel.	Sail.	Total.	Tonnage.	Men
March		2	16	19	6,230	184
April	89	89	243	809	16,613	4,779
May	93	54	290	906	204,700	5,868
June	49	62	950	1,041	241,110	6,902
July	41	88	923	1 050	235,700	6,599
August	46	69	117	1 009	228,110	6,115
September	42	102	735	886	207,793	5,787
October	84	81	189	714	201,174	7,297
November	10	21	802	833	74,955	2,250
December	2	0	30	44	11,309	434
Total	806	615	5,483	8,307	1,469,913	51,448
Arrivals unreported, (estimated)				1 900	299,300	7,500
Total				7,787	1,768,413	58,938
Total in 1856				7 238	1 689,979	54 533
Total in 1855				8,010	1 806,856	
Total in 1854				8,021	1 742,844	

There were laid up in winter quarters at this port, 1857–8, 7 steamers, 29 propellers and 1 214 sail vessels

POPULATION OF CHICAGO

We present the following table showing the population of Chicago at different periods:

1840	4,470	1870	298,999
1843	7,580	1882	503,185
1846	12,088	1848	29,963
1850	14,169	1853	35,852
1847	16 633	1853	33,909
1865	29,963	1856	110,000
1860	35,047	1857	150,000

RAILWAY PROGRESS.

In January 1852, there was but one railway—the Galena forty miles long—entering Chicago. The list of roads whose business tends to swell the commerce of that city, now actually completed and in operation, is as follows:

	Miles.
Chicago and Milwaukee	85
Kenosha and Rockford	11
Racine and Mississippi	66
Chicago, St. Paul and Fond du Lac	141
Milwaukee and Mississippi (Western Division)	195
Galena and Chicago Union	121
Fox River Valley	44
Wisconsin Central	6
Beloit Branch	20
Beloit and Madison	17
Mineral Point	22
Dubuque and Pacific	29
Galena (Fulton) Air Line	126
Chicago, Iowa and Nebraska	26
Chicago Burlington and Quincy	210
Burlington and Mississippi	35
Quincy and Chicago	100
Hannibal and St. Joseph	65
Chicago and Rock Island	108
Mississippi and Missouri, 1st Division	38
" 2d "	50
" 3d "	13
Peoria and Bureau Valley	47
Peoria and Oquawka	143
St. Louis, Alton and Chicago	262
Illinois Central	104
Pittsburgh, Fort Wayne and Chicago	262
Michigan Southern and Northern Indiana	242
Cincinnati, Peru and Chicago	28
Michigan Central	213
New Albany and Salem	264
Eleven trunk and twenty branch and extension lines	2,963

The total earnings of all those roads for 1886 were $17 343 242.83, in 1887 they were $18 596 520 26. Only six years previous the earnings of the forty miles in operation were a mere nominal sum. The State of Illinois alone has now 2 175 miles of completed railway six years ago it had but 85. Comment upon the above tables and figures, for which we are indebted to the valuable yearly statistical articles of the Chicago DAILY PRESS, is entirely unnecessary, they show more clearly than language possibly can the rapid progress of the North West in wealth population and the means of commercial and social intercourse. Let it be observed that the commerce with the seaboard of all the country bordering upon the railways centering in Chicago with the exception of the three eastern lines, the Michigan Central the Michigan Southern and the Pittsburgh roads, would be tributary to the Georgian Bay Canal. But that is not all By the time the canal can be completed, thousands of miles more of railway extending in every direction through this vast, fertile region will be pouring the wealth of millions of enterprising, energetic freemen into the navies of Lake Michigan and the great majority of that commerce will flow through this magnificent highway for the trade of the northwest and the St. Lawrence to the ocean An empire will by that time have grown up north and west of Lake Superior which will contribute its traffic to swell the receipts and reward the enterprise of those who shall build this canal

CONCLUSION

By reference to the preceding tables it will be seen that the Georgian Bay route is nearly three hundred miles shorter than any other except the Ottawa route, that it is 90 cents per ton cheaper than via Buffalo and 15 cents per ton cheaper than via Welland Canal and Oswego. That by the Lake Champlain route, the Georgian Bay route is 26 cents per ton cheaper than via Welland Canal and 38 cents per ton cheaper than via the Ottawa route

That to Quebec the Georgian Bay route is 15 cents per ton cheaper than via Welland Canal and 33 cents per ton cheaper than via the Ottawa route.

In point of time the Georgian Bay route would save about one day over any other In comparing the Georgian Bay route via Oswego Champlain and Montreal, we find that the route via

Champlain is 45 cents per ton cheaper than via Oswego, and to Quebec is $1 45 per ton cheaper than v a Oswego, and $1 00 per ton cheaper than via Champlain. There can hardly be a doubt but what this margin is sufficient to secure at least a fair proportion of the immense trade of the west through the St. Lawrence and I can see no good reason why it should not secure much the largest share of it.

On the Ottawa route, not having very reliable information about it, but knowing that over 400 miles of it would be close navigation, I have assumed 200 of it to be canal or equal to a canal in expense of navigation. Several objections present themselves to that route;

1st. The route being so much further north there would be a loss of from two to four weeks time each year in the navigation

2d. It enters the St. Lawrence at a point where the trade must necessarily go down the St. Lawrence instead of having a choice of routes, unless the Caughnawaga Canal is built, and in that event it would not have the choice via Oswego

3d. The trade would be more divided between that route and Buffalo than it would be between the Georgian Bay route and Buffalo, for much that passes through the Georgian Bay route would be intercepted at Oswego and pass through more than 200 miles of the New York canals

4th. The entire business would be lost to the St. Lawrence canals, and the direct benefit to Canada would be far less than by the construction of the Georgian Bay canal

The Georgian Bay route has the advantage of good navigation to and from it, avoiding St. Clair flats and the dangerous navigation of Lake Erie, as I at a moderate expense may have safe and commodious harbors at each end of it There would be a saving of nearly 300 miles in distance, a saving in expense of transportation, and of time and insurance. It enters Lake Ontario at a point where if the Caughnawaga Canal is built, trade has a choice of three routes to tide water, and the entire business from two of them would pass through the St. Lawrence canals It will be seen by Mr Tully's report that the supply of water is abundant, not only for the canal but for extensive water power and that all the materials required in its construction are convenient.

It has been assumed in the comparison of the routes that the St. Clair flats would be improved so as to admit the passage of 1000 ton vessels How difficult this would be I am unable to say but I am credibly informed that the expenditures at that point hereto-

fore has not produced any beneficial effects in the improvement of navigation. It is probable, therefore, that in the event of this route being improved, that there would be more liability of interruption and detention than by the Georgian Bay route.

When we take into view the vast extent of country whose business must seek an outlet through this channel the conviction is irresistible that the wants and necessities of the west will not be met until the Georgian Bay and Caughnawaga Canals are constructed, the Oswego and Champlain canals enlarged—the first equal to the Erie canal and the last for the passage of 1000 ton vessels, and the St. Lawrence improved for the passage of the same sized vessels.

When this is done a direct trade will be opened between Chicago and all parts of the world To doubt this would be to doubt the intelligence and energy of the business men of Chicago, Milwaukee and the Lake Michigan cities.

They have already in fact, commenced the trade, and nothing is required for its successful prosecution but an improvement of the navigation so as to admit of a large class of vessels.

Let us examine for a moment the cost of these improvements.

Georgian Bay Canal	$20,170,750
Caughnawaga Canal	4,270,680
Champlain Canal, Estimated	6,000,000
Improvement of the Hudson say	2,000,000
St. Lawrence Canal, Estimated	8,000,000
Total	$40,421,430

But suppose they cost $50 000,000 where, I would ask among the hundreds of millions of dollars that have been spent in public improvements could you select the expenditure of $50 000 000 the benefits of which are so widely diffused and promising such vast results in the future as would the completion of these improvements under consideration?

Let the cities of Canada awake to their true interest, let them unite heartily in this enterprise and great as it confessedly is, it can certainly I might add easily be accomplished It would secure beyond a peradventure for the cities of the St. Lawrence, Toronto, Montreal and Quebec, a leading and a commanding position upon the American continent.

In this connection I quote the language of Wm. Bross Esq., editor of the Chicago DAILY PRESS, who, from the commencement

of the important enterprise has devoted much time and energy to bring it before the public and in a speech before the convention at Toronto, Sept. 13th, 1865 :

"I once heard Capt. Bogardus a veteran sailor of our city who commenced his eventful career on Lake Ontario, in 1812, after referring to the growth and endless prospective value of the products of the west, say 'Thus the great God, when he made the mighty west made also the lakes and the mighty St. Lawrence to facilitate commerce to the ocean' and, I might add, as well as cheap to bear the boiling current of August to the sea in Europe, as to ship the products of those 700,000 square miles to the ocean by the Erie and the Welland Canals and all the railways now or hereafter to be constructed."

The same gentleman in an article in the Press after showing the immense benefits which the Georgian Bay Canal would confer upon Toronto, closes with the following paragraph in relation to Montreal, applicable, with nearly equal force to Quebec

"For the purpose of direct trade with Europe, it matters little whether vessels (from the lakes) go directly through, or whether cargoes are transhipped at Montreal. In our judgment, certainly during the summer transhipment there into very large ocean vessels and steamers would be found the most profitable. In the winter, propellers and sail vessels, especially if they intend to use thousand tons, might find it more profitable to escape from the embargo of ice upon the lakes, and spend the winter in the American or European coasting trade. But in any event, Montreal would hold the key to all the immense trade of the west, flowing down the St. Lawrence to the ocean. Her merchants would furnish assorted cargoes of goods for the west from all parts of the globe, from which full cargoes could not be made up to the lake cities. In any event, she would be to the trade of the St Lawrence what New York is to that of the Hudson. It needs but the enterprise on the part of her citizens corresponding to the magnitude of the interests at stake to secure for her this grand position, beyond any contingency. It is true that national pride and immense capital and the beaten track of commerce, are on the side of New York but God and nature are stronger than all these, and let any intelligent man compare the 'three ditch' with the mighty St Lawrence, with a canal to pass vessels of 1,000 tons burden from Georgian Bay to Toronto, and he cannot doubt for a moment on which side the immutable laws of commerce will decide the contest."

I am much indebted to the valuable reports of Col J D Graham U S Army, John B Jervis, and William J McAlpine, Esqrs, and to William Bross Esq., editor of the Chicago DAILY Press, and others, for much important statistical information

Very respectfully submitted

R B. MASON, *Consulting Engineer*

REPORT,

BY KIVAS TULLY, ESQ.

CHIEF ENGINEER'S OFFICE,
Toronto, January 15th 1851.

SIR—On the 14th of September, 1850, the Committee appointed by the convention of delegates from Chicago, Oswego, Toronto and Barrie instructed me "to complete the survey of a route for the canal from Toronto *via* Lake Simcoe to the Georgian Bay *via* Lake Huron and to report to the Committee with a topographical description of the country, levels, heights, sections, and approximate estimates for the construction of a canal capable of passing vessels of one thousand tons burthen, a profile of the line to be furnished with the report."

The Committee also arranged that the members of the Chicago delegation should secure the services of one of the most eminent engineers, to go over the ground with Mr. Tully, and act with him as consulting engineer in the progress of the survey.

In accordance with the tenor of the above resolutions, I herewith submit my report on the several proposed routes to which I consider my duties to have been confined, leaving to the consulting engineer, Col. R. B. Mason, of Chicago, the important task of furnishing the necessary statistical information in reference to the extent of the anticipated trade that may be relied on as the means of defraying the cost of construction.

In my preliminary report to you as President of the Board of Trade, containing a statement of the field operations of the various routes dated the 22d of January, 1847, it is mentioned that between the 16th and 23d of November, 1850, I accompanied Col. Mason the consulting engineer, when he made an examination of the route and at a conference with the Committee held afterward, a further survey of the route between Lake Couchiching at the north eastern extremity of Lake Simcoe and Match

adash Bay, was recommended by him as essentially necessary, also approximate profiles of a route through Albion and from the Holland river to the Nottawasaga river which was afterward formally sanctioned and ordered by the Committee. In conformity with these suggestions and directions I have also to submit the required information in reference to these routes, with the plans and profiles of the same without which information the report could not be said to have been satisfactorily completed.

I have the honor to remain sir

Your obedient servant,

KIVAS TULLY

THOMAS CLARKSON, ESQ.,
Chairman of the Committee, and President of the Board of Trade, Toronto.

REPORT

The peculiar outline of the western portion of the Province of Canada, with respect to the northern boundary line of the United States, has often been subject to comment by several public writers. The short distance between the Georgian Bay and Lake Ontario in the vicinity of Toronto across this western peninsula, compared with the circuitous route by Lakes Erie and Huron has long attracted the attention of those who have taken an interest in the progress of this section of the province and suggested this route as a probable means of water communication with the north west.

From the earliest period of the history of this province the route from Toronto by Lake Simcoe to the Georgian Bay on Lake Huron has been known and used as a portage by the Indians and traders to the north west, in preference to the routes by the Ottawa river or Lake Erie. The rapid increase during the last ten years, of the population, and consequent agricultural and commercial progress of the States of the American Union, lying immediately west of Lake Michigan and the serious losses to life property and shipping on the St. Clair Flats and Lake Erie, also, the limited facilities afforded by the Erie canal for the transport of merchandise to and from these western states, have directed the serious attention of merchants and shipowners in the United States and Canada to the construction of the Toronto and Georgian Bay Ship Canal as an additional avenue for facilitating the internal commercial transport between the west and the seaboard.

It is now nearly twelve years since this route was first explored by me at the request of Dr Ross of this city [see appendix to report] but the probable cost of the proposed communication, compared with the prospective trade, prevented any serious discussion on the subject. In fact it was considered altogether chimerical at that time, and beyond the mere exploration, the question was not entertained.

The cost of the extensive excavation that would have to be made through the ridge of land lying between Lakes Simcoe and Ontario, so as to permit the use of the waters of Lake Simcoe as a feeder to the proposed canal, was considered at that time to be beyond the demands of the western trade but the unparalleled rapidity with which this trade has increased during the last ten years as it is undoubted future augmentation, has forced the question prominently on the attention of the mercantile community, and the demand for an additional avenue is now seriously made.

In a letter addressed by me to John B Robinson Esq., M P P, for this city, a copy of which accompanies the report, I have endeavored to point out the failure of the Welland Canal in diverting the western trade to the River St. Lawrence as the cheapest route between the north-west portion of this continent and Europe, the consequent demand for the construction of an additional avenue at a more northerly point than Lake Erie, and the superior advantages of this route over all others in reference to distance and anticipated economical working.

I now feel satisfied, from tangible evidence, that the statements there made will be fully borne out and established in this report, and also in that of the Consulting Engineer, Col R. B. Mason, which is now in course of preparation

The delay that has occurred in the completion of the survey was unavoidable. I was unwilling that any but reliable information should be presented to the public, as, in the absence of reliable data, the future success of the undertaking might be seriously regarded and the construction of the canal delayed In order to present the requisite information in as distinct and satisfactory a manner as possible the report has been framed under the following heads

1st. Terminal Harbor accommodation. 2d. Water supply to the canal. 3d Cost of construction 4th Comparison of the routes. 5th. General comparison with other routes 6th Collateral advantages 7th. Conclusion.

I.—TERMINAL HARBOR ACCOMMODATION

At the convention held in this city on the 13th of September, 1865 to consider the question of the construction of the Georgian Bay Canal it was unanimously

Resolved, That the immense trade from the North-west demands the immediate construction of a canal between the Upper Lakes and Lake Ontario of sufficient capacity to pass vessels of 1000 tons burthen from Lake Huron to Lake Ontario at Toronto or its vicinity

In accordance with the instructions of the committee, Toronto Harbor was made the starting point from Lake Ontario The survey was commenced immediately west of the old Fort, and the ground between this point and Lambton on the River Humber was accurately measured and leveled From the Grand Trunk Railway Bridge, where it crosses the River Don, a line was also leveled along the banks of the river and a branch of the Don which crosses Yonge street, immediately south of the city continuing along the base of the Davenport hill until it joined the western line. The intention of surveying and leveling those lines was to ascertain the approximate elevation of the ground above the level of the Humber River and otherwise determine the feasibility of constructing both those branches not only as termini but also as an available water power the future advantage of which would be incalculable to the prosperity of this city for manufacturing and ordinary mechanical purposes

I regret to state that without the expenditure of a much larger amount than will be required to construct the proposed canal by another terminal line, this desirable result cannot be obtained. The principal difficulties to be overcome are the incapacity of the entrance to the harbor of Toronto to permit the passage of vessels of 1000 tons and drawing 12 feet of water, and the necessity of constructing a high dam across the Humber and an aqueduct across the Black Creek at a point about two miles above Weston

At the lowest water level of Lake Ontario which must be taken as the datum as far as regards a terminal harbor there would be only eleven feet of water in the channel at the entrance, and the bottom being rock could not be deepened except at considerable expense As the proposed terminus of the canal would have been to the west of Toronto in moderate weather only vessels could enter or leave the canal without entering Toronto Harbor, but this is a contingency that should not be risked

The terminal harbor accommodation for shipping should be safe easy of access under ordinary circumstances, and commodious. In no respect could this be attained at the proposed terminus west of the Queen's Wharf without the expenditure of a much larger amount than would be necessary if a harbor was constructed elsewhere. The only feasible line by which Toronto Harbor could be made the terminus would be to the east by the valley of the river Don where the requisite depth of water could be procured at a reasonable cost. This line would require the construction of an eastern entrance at Ashbridge's Bay. To construct a suitable terminal entrance for the proposed Ship Canal at this place would require a much larger amount than would be necessary at the mouth of the Humber River for a harbor of a superior character.

Even during the highest water level on Lake Ontario which would give 16 feet of water on the present entrance to the Toronto harbor the passage of a vessel of 1000 tons, and drawing 15 feet of water, during a south westerly gale, would be attended with great risk.

For these reasons I have come to the conclusion that the necessary terminal accommodation cannot be afforded at the harbor of Toronto within a reasonable cost. The explorations and surveys of the several routes demonstrate that the valley of the River Humber is the most direct and practicable line that can be adopted for the southern portion of the canal. The cost of constructing the canal from Weston to the mouth of the River Humber will not be greater than would be necessary under the most favorable circumstances, and would be of an ordinary character whereas if the terminus was at Toronto, the apparent cost of the intermediate construction would be much greater so much so that I have not considered it necessary to encumber the Report with a comparison of the estimates. In addition to the above the Eastern line with a terminus at Ashbridge's Bay would be six miles longer; and the Western line with a terminus at the Queen's Wharf, two miles longer than the Humber line. Under these circumstances therefore I consider the Humber line offers the greatest advantages and so recommend in the line the Humber Bay would be assumed as the southern terminal entrance of the canal. By the construction of two piers of crib work, 2,000 feet in length and 40 feet in width 200 feet apart, and extending into 20 feet of water with a depth of not less than 13 feet, at low water, inside the piers, a terminal harbor, safe, easy

of access, and commodious, can be obtained at the Humber Bay This bay is protected from the effects of north westerly also easterly storms, which are the most violent on Lake Ontario by the Peninsula, south of Toronto about 4 miles distant; but there is little or no protection from south westerly storms, which prevail during the autumn unless when close to the entrance, which is sheltered by a projecting headland to the west. The distance to the opposite shore of the Lake being only 30 miles, the force of the wave would not be such as to materially endanger the safety of a large vessel running between piers 200 feet apart, and in 20 feet of water, whilst smaller vessels of 500 tons can run into Toronto harbor in safety, during unusually severe gales from this quarter During the period of low water the Humber Bay with the proposed piers, would be the only available terminal harbor for vessels of the capacity for which the canal is proposed to be constructed.

Within the line of shore, after passing between the piers the marsh is proposed to be excavated to the extent of eight acres, so as to afford sufficient accommodation for the anticipated traffic, and is capable of being enlarged if required.

For the terminal harbor accommodation on Lake Huron two points have been surveyed—one at the mouth of the Nottawasaga River and the other at Matchedash or Gloucester Bay The selection of either of these harbors will in a great measure be determined by the choice of routes, but, as respects the amount to be expended in each, the Nottawasaga River requires a less outlay By the construction of piers, of the same character as those recommended for the Humber Bay also 200 feet in length, a harbor similar in many respects may be obtained. The mouth of the Nottawasaga River would be exposed to the north west gales of the Georgian Bay, which are sometimes very violent in the spring and autumn, and would have a range of 100 miles to Cabot's Head.

This would no doubt be a serious difficulty in a nautical point of view but the risk would not be so hazardous if ordinary caution is used. Supposing a vessel to be running for the entrance of the canal at the mouth of the Nottawasaga River the vessel would pass close to the Christian Islands, under the lee of which shelter could be procured until the severity of the storm had passed, when the entrance of the harbor 20 miles distant, could be reached in safety

This course would not be necessary during ordinary gales, but only in case of unusually severe storms. With this exception, Nottawasaga Bay offers every facility for a suitable terminal harbor, the approach being marked with bold headlands and with deep water one mile from the shore

For the better explanation of the capabilities of this river and the Harbor as terminal harbors, I have prepared detailed charts of the same, which are herewith submitted. By reference to the chart of the Nottawasaga River which has been drawn from actual survey, it will be noticed that the river extends in a south-westerly direction parallel to the line of the shore for a distance of nearly 8 miles with a width varying from 220 feet to 660 feet, and an average depth of 10 feet, containing a suitable harbor accommodation of over 150 acres, at a moderate outlay for deepening and improvement, the cost of which is stated in the general estimate.

Gloucester Bay, through which a vessel would pass to Matchedash Bay, being what is termed land locked would, in the case of sailing vessels, be objectionable on account of its being too much sheltered; but this would not affect steam propellors

In order to render Matchedash Bay available as a terminal harbor it would be necessary to dredge a channel one hundred feet wide through the centre, for nearly four miles, and also to remove a large quantity of granite boulders This latter work would be attended with a considerable and unavoidable expense the approximate cost of which is given in the general estimate

On this account, I consider this bay inferior to the Nottawasaga river as a terminal harbor, and am therefore strongly in favor of the latter

I am aware that strong objections have been urged successfully against the practicability of forming and maintaining a harbor at the mouth of the Nottawasaga river I cannot agree with such opinions, and would here mention that on my first inspection of this harbor in company with Col. Mason the consulting engineer, more than two years since, I did not hesitate to express my belief that a safe and commodious harbor could be constructed at this point, superior to many of the harbors on the lakes with which Col. Mason agreed and I am satisfied he has not since changed his opinion In fact we were both fully convinced that an industrious and populous city would sooner or later spring up on the banks of the river and the narrow peninsular which divides it from the bay

B.—WATER SUPPLY TO THE CANAL.

The proposed dimensions of the locks are 265 feet in length, 45 feet in width, 12 feet lift, and 12 feet on the sill.

Two locks of these dimensions would require 850 000 cubic feet of water nearly, for each vessel passing through the canal. If 800 vessels passed through during the day 17 000 000 cubic feet would be required or about 12,000 cubic feet per minute. According to two experiments on the quantity of water flowing from Lake Simcoe into Lake Couchiching at the narrows, the quantity of water at this point amounted to over 100 000 cubic feet per minute, making due allowance for the inedlen at the bottom and sides.

The average rain fall of the water shed of Lake Simcoe (1 200 square miles), according to a statement procured from the Meteorological Observatory, at Toronto [*See Appendix C*], and extending over a period of seventeen years, gives 36 94 inches and allowing for evaporation absorption and vegetation say 24 84 inches we have twelve inches available rain fall per square foot for the year This would give 20 000 000 per day, or 60,000 per minute. The available supply would be greater than this, judging by the experiments at the narrows, which gave over 100 000 cubic feet per minute According to experiments in the county of Hertford, in England the evaporative effect was as 16 to 27 nearly or a little above 60 per cent. leaving 33½ per cent. additional to be consumed by vegetation What the exact amount of loss from this cause is, cannot be ascertained, but the sum of both would hardly exceed two thirds of the whole rain fall, which would be five times as much as would be required to pass fifty vessels of 1,000 tons each, per day, as this would be the greatest number of vessels that could be passed through the canal conveniently in fifteen hours allowing a little over fifteen minutes for each vessel to pass through the locks. There will still be a large available water power which, along the entire line of the canal after passing the summit level, will form a source of considerable future profit by renting the same for mills and manufactories

Immediately after passing the summit, an additional water power would be also available from the water sheds of the Humbar and Nottawasaga rivers, amounting to 80 000 cubic feet per minute and 52 000 cubic feet per minute respectively along the line of the canal, based on the same calculations of an average

of twelve inches per superficial foot per annum. Further evidence is hardly necessary and from the above sources there will not only be a sufficient supply of water to feed the canal, but a large remaining available water power in fact, an inexhaustible supply for the wants of a much more numerous population than can be anticipated at present.

In order to store up the rain fall of the Lake Simcoe water shed, it will be necessary to construct one waste weir and three close dams at the branches of the river Severn, at the north eastern extremity of lake Couchiching the cost of which is stated in the general estimate.

III.—COST OF CONSTRUCTION

This question also embraces the practicability of the construction of the several proposed routes.

The route as originally agreed on commenced at Toronto or its vicinity, passed along the valley of the Humber in a northerly direction through the township of Kings to the Holland river and Cook's Bay, on Lake Simcoe, from thence to Kempenfeldt Bay, on the western shore of Lake Simcoe. The starting point from Kempenfeldt Bay was from the mouth of a creek about one mile from Barrie at the extremity of the bay, thence in a westerly direction to the Nottawasaga river, about one mile north of the Ontario Simcoe and Huron railway line and following the valley of the river to the Nottawasaga Bay, the most southerly portion of the Georgian Bay, Lake Huron

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ROUTE NO ONE.

The terminal harbor accommodation having been already considered, it is only necessary to describe the extent and character of the works to be executed between the termini

Along the valley of the Humber there are no engineering difficulties of an extraordinary character as far as the 23d section at the town line of Vaughan and King where the deep excavation through the ridges commences. This excavation extends to the 33d section, or ten miles The greatest depth to be excavated will be 197 76

feet, or 2.24 under 200 feet. This will be the greatest depth from the summit. The ridges present a gradual inclination north and south, the slope to the north being 5¼ miles in length, and the southern slope 4¼ miles, total length 10 miles. The depth of this excavation will average 30 feet, and will contain nearly 40 000 000 cubic yards and being composed, as far as can be conjectured, of light clay and gravel, will not cost more than 25 cents per yard, making a total of $12 000 000. From the 33d section to the 48th, to Cook's Bay at Lake Simcoe the canal would pass through the Holland River marsh, following the course of the Holland River, except at the bends of the river which are cut off. A considerable portion of this river is of an available capacity and would require slight alterations, averaging 150 feet in width with a depth of water from 8 to 12 feet.

From the 48th to the 71st section at the western extremity of Kempenfeldt Bay it will be lake navigation where there are no difficulties to be encountered. Lake Simcoe being of sufficient capacity to admit vessels of a huge tonnage navigating it without any risk. At the 48th and 71st sections piers of timber crib work of a suitable character have to be constructed.

From section No 1 to No. 8 there will be a deep excavation averaging 50 feet, the greatest depth at section No 2 being 78 feet, and containing a little over 6 000 000 cubic yards at twenty five cents per cubic yard, the total cost of which would be $1 500 000 — the material to be excavated being of the same quality as described in the deep excavation in the ridges as far as can be judged from geological data, and other indications. [*See Appendix D.*]

At section No. 8 the character of the work comprises a chain of combination locks six in number. From this section to No. 25, there are no engineering difficulties as the canal will follow the course of the Nottawasaga River, which with slight improvements, can be rendered of sufficient capacity to answer the required purposes. This portion, 16 miles in length being liable to heavy floods in the Spring and Autumn will require a much higher tow path than usual which will slightly increase the average cost per mile. Between the 25th and the 27th sections, it will be necessary to cut a channel through the sand ridge which forms the south eastern bank of the Nottawasaga Harbor, in order to save a distance of six miles a waste weir being constructed across the river to maintain the water at the required level.

The total quantity contained in this excavation will be over 2,000,000 cubic yards, the greatest depth being 100 feet, and the average depth 50 feet; the cost of this excavation would be $500 000.

From the 27th to the 29th section the work would consist of dredging the bed of the river of an average depth of two feet. The 29th section reaches the Nottawasaga Bay, where a harbor is to be constructed as before described.

The lockage on route No. 1 will consist of two single locks, eight double locks three treble locks, and three quadruple combination locks, being thirty nine locks in number from Lake Ontario to Lake Simcoe, having an average lift of a little over 12 feet, and the total lockage of 470 feet.

From Kempenfeldt Bay to Lake Huron there will be five single locks, and six combination locks, or altogether eleven locks with an average lift of a little under 12 feet, or 130 feet in all—making the total lockage of route No 1 to be 600 feet.

In nearly every instance where combination locks have been provided it was a matter of necessity from the nature of the surface Though objectionable in many respects it is of advantage in consequence of increasing the length of the levels, which on this route will vary from 1 to 16 miles, not including the long summit level of Lake Simcoe of 38 miles. The total length of this route will be 100 statute miles.

The canal, if constructed by this route would cross the Great Western and Grand Trunk Railways, and the Ontario Simcoe and Huron Railway twice At each of these points as indicated on the map, a railway swing bridge must be constructed Accommodation swing bridges of an ordinary character will have to be constructed at several points along the route. For crossing the deep excavation it is proposed to have four accommodation bridges 90 feet above the level of the water with inclined approaches of 1 in 20, each bridge to be two miles apart for the entire length.

ROUTE NO. TWO,

Comprises the first portion of route No. 1, between Lakes Ontario and Simcoe.

The continuation of the line extends from the terminus on Lake Simcoe to Dr Robinson's creek, on the north-west shore of Lake

Coudbiching, at the north-eastern extremity of Lake Simcoe, about midway between the "Narrows and the River Severn." The distance from Lake Ontario to this point being eighty one miles, from section 49 to 81, comprises Lake Simcoe the only difficult portion of the navigation being at the Narrows, which consists of a circuitous and hazardous channel. The Board of Public Works of this Province has ordered the necessary improvements which have been in course of execution during the past year, rendering any additional expenditure unnecessary except the contingency of deepening the channel still more as the present improvement only contemplated accommodation for steam vessels drawing eight or nine feet of water.

From Dr Robinson's creek to Matchedash Bay the canal would be fourteen miles in length.

Between sections Nos. 1 and 4, a deep excavation will be necessary principally through limestone rock, containing over 6,500 000 cubic yards, at a cost of the same amount in dollars, the cost of excavation being estimated at $1 per cubic yard. The greatest depth would be 138 feet, and the average depth 75 feet. From section No. 4 to No. 6 the construction is of an ordinary character, between Nos. 8 and 9 an excavation also through limestone rock, occurs, containing 500 000 cubic yards, and at section No 13 an excavation through granite containing 300 000 cubic yards at a cost of at least $3 per cubic yard. Between sections 14 and 17 (Matchedash Bay) a channel will have to be excavated 100 feet in width and a trackway in rock work constructed the quantity of excavation, a large portion of which would be through granite would be nearly 1 000,000 cubic yards, the cost of which would be $3 250 000 including the cost of the trackway and harbor accommodation.

The lockage on route No. 2 consists of six single locks, one double and one treble combination lock—11 locks altogether the lift being the same as for Route No 1 between Lake Simcoe and Lake Huron and the total lockage 600 feet.

The total distance by this route denominated No 2 combining a portion of No. 1, would be 93 miles, comprising 83 miles of summit level including Lake Simcoe, and levels ranging in length from one quarter of a mile to 30 miles.

The cost of bridging on route No 2 not including the combined portion of No 1, would be trifling as the country through which the canal would pass, is unsettled excepting portions at the termini

A trackway of timber arch work, 20 feet in width and three miles in length, must be constructed on the east side of the channel to be excavated through Matchedash Bay, also harbor accommodation at the entrance on Gloucester Bay

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ROUTE NO. THREE.

Comprises a portion of No. 1 as far as the 14th section from which point it branches off to the west, through the valley of the north west branch of the Humber and the township of Albion, and the valley of the Nottawasaga River in Tecumseth and Essa where it again joins route No. 1, at section No. 10, and continues along this line to the terminal harbor, at the mouth of the Nottawasaga River

The deepest excavation on this route occurs between sections Nos. 13 and 28, containing 114,000,000 cubic yards, which would cost $28 500,000 and the greatest depth to 246 feet an amount which places this route, bey and all comparison, the most expensive

It was considered necessary to arrive at some approximate estimate of the cost of this route, as several persons living in the township of Albion were under the impression that this was the most direct and cheapest route for the canal.

The cost of the necessary excavation as stated above, will as a matter of course completely remove this impression. In addition to this cost, a feeder from Lake Simcoe would require to be constructed The lockage would be the same as No 1 and the length would be 88 miles.

ROUTE NO. FOUR

Comprises the principal portion of No. 1 as far as section No 35 where it branches off from the Holland River through North Gwillimbury and Tecumseth toward the Nottawasaga River where it joins route No. 3 at section 32

This was one of the routes approved and recommended by Col. Mason to the committee in 1835, and will be found to possess many super or advantages in comparison with other routes.

This route like No 3 does not enter Lake Simcoe, though it is proposed to be connected with it by a navigable feeder adapted

for a smaller class of vessels. The greatest amount of excavation on this route occurs between sections Nos. 2 and 3 containing 5,000,000 cubic yards which would cost 2,000,000 the greatest depth being 193 feet, and the average depth 64 feet.

From section 32 of route No. 3 to section No. 10 of route No. 1, where No. 2 joins, there are no constructive difficulties as the fall in the valley of the Nottawasaga river is comparatively trifling for the whole of this distance (eighteen miles). The line then continues along route No. 1 to the terminal harbor at the mouth of the Nottawasaga river. The lockage on this route will be the same as No. 1 (600 feet) and the distance 84 miles. Several accommodation bridges will be required on this route.

ESTIMATE OF COST

Subjoined are the estimates of the cost of the proposed routes, route No. 1 being the least, and route No. 3 the greatest, the difference between Nos. 1 and 2 being trifling.

The cost of the harbor accommodation of No. 2, is the largest, and Nos. 3 and 4 the least. It will also be observed, that in the construction of route No. 3 a much larger amount of excavation would be required than in the other routes, and next in order Nos. 4 and 2. The sum of the locks has been determined by the dimensions of the propeller Iowa of 1,000 tons, namely, 242 feet long 31½ feet wide, and drawing 11½ feet of water when loaded, making allowance for the necessary space for opening and closing the gates; locks 265 feet in length 55 feet in width and 13 feet on the sill, are considered sufficient for the purpose. Two enhancers of 400 tons each can also pass through locks of these dimensions at the same time.

The canal is intended to be 115 feet wide at the water line, and 13 feet in depth except in the deep excavation where the width at the water line is proposed to be 100 feet, and through the rock cutting on route No. 2 90 feet at the water level and 100 feet above the level of the towpath.

The greatest width of the deep excavation through the ridges in King would be 880 feet at the surface level.

ESTIMATE OF ROUTE No. 1.

QUANTITY	DESCRIPTION OF WORK.	RATE.	DOLLS.
83,200 000 c. yds.	Earth excavation	25c	$15,856,000
	20 locks complete	$80 000	4,000,000
	4 dams	5,000	20,000
	36 waste weirs	4,000	180,000
	2 harbor accommodations	200,000	400,000
	2 harbor Lake Simcoe	100 000	200,000
	50 accommodation bridges	5,000	250 000
	14 culverts	8,000	120,000
	Land damages		300,000
			$21,116,000
	Engineering and contingencies		1 054 760
			$22,170,760

ESTIMATE OF ROUTE No. 2.

QUANTITY	DESCRIPTION OF WORK.	RATE.	DOLLS.
54,000,000 c. yds.	Earth excavation	25c	$13,500,000
6 000 000 "	Rock excavation, Limestone	$1 00	6 000,000
700 000 "	Rock excavation, granite	$ 35	3,150 000
	Locks		4,000 000
	Dams		20 000
	Waste weirs		180 000
	Harbor accommodation Lake Simcoe		600,000
			200,000
	Bridges		250 000
	Culverts		168,000
	Land damages		200,000
			$27,030 000
	Engineering and contingencies		1,351,000
			$28 371 000

ESTIMATE OF ROUTE No. 3

QUANTITY	DESCRIPTION OF WORK	RATE.	DOLLS.
123 000,000 c. yds	Earth excavation including feeder	25c	$30,750,000
	Locks		6,000,000
	Dams		20,000
	Waste Weirs		180 000
	Harbor accommodations		400 000
	Bridges		250 000
	Culverts		180 000
	Land damages.		600,000
			$38,380 000
	Engineering and contingencies		2,103,000
			$41 083 000

ESTIMATE OF ROUTE No. 4.

QUANTITY	DESCRIPTION OF WORK	RATE	DOLLS.
70,000,000 c. y'ds.	Earth excavation	25c	$17 500,000
	Rock		4,620,000
	Dams		30,000
	Weirs		180,000
	Harbor accommodation		400,000
	Bridges		240,000
	Culverts		180,000
	Land damages		250,000
			$23,600,000
	Engineering and contingencies		1,120,000
			$23 710 000

COMPARISON OF THE ROUTES.

With respect to the terminal harbor accommodation routes Nos 1 3 and 4 are on an equality and would, in my opinion be superior to No 2 the terminal harbor of which would be at Matchedash Bay Beside the difficulty of constructing a channel through Matchedash Bay there would be a grave risk to vessels drifting aground, not only on the west side of the channel during easterly winds, but also in Gloucester Bay On the east side there are several large granite boulders, to remove which and construct a roadway on the west side of the channel through Matchedash Bay, would add nearly $1 000 000 more to the estimate As a harbor of refuge, the west side of Gloucester Bay would be superior in every respect, and would afford the most ample accommodation for all classes of vessels during the season of navigation For sailing vessels it is rather too much sheltered but for propellers it would be accessible at all times.

In the early portion of the spring and late in the autumn, the sheltered waters would also be frozen at least one week sooner the entrance to the harbor being nearly half a degree further north than the proposed terminal harbor at the Nottawassaga River For general traffic I would, therefore, recommend the other routes in preference to No. 2, for terminal harbor accommodation. The comparative cost of the route is as follows

No 1	$23,1 0 750
No 2	23,580,500
No. 3	41,062,000
No. 4	23,712,500

The details are stated in the estimate With regard to cost, No. 1 route is most favorable, The difference between Nos 1, 2 and 4 can not be considered sufficient to give one route a very great advantage over the other in this respect, but the cost of route No. 3 being double precludes any further argument in its favor The comparison therefore between Nos. 1, 2 and 4 will be narrowed to the question of facilities of construction and economical working The heavy amount of rock excavation encountered in route No. 2 appears objectionable on account of the increased price but the quantity being much less on account of the side slopes being decreased, the difference of cost will not be so great as stated in the estimate

The limestone to be excavated being of a quality that could be used in the construction of the locks on this section of the route if not on others, would diminish the cost of this excavation. As this is in a great measure a matter of conjecture, no deduction has been made in the estimate on this account, particularly as it is probable that the stone required for building the locks on the remaining sections would be procured from other localities

The question of terminal harbor accommodation and cost having been decided that of incremental working has next to be considered. The lockage being the same on all the routes, the length of the routes and time occupied in passing through the canal, will determine the superiority The respective lengths and time will be as follows

ROUTE	LENGTH IN MILES				TIME OF ROUTES.		
	Lake Districts.	Summits.	Other levels.	Total.	Canals.	Locks.	Total.
Route No. 1	22	33	44	100	37	16	53
Route No 2	25	30	36	91	33	16	49
Route No. 3	—	29	80	83	29	16	45
Route No 4	—	26	58	84	33	15	48

In the above calculations the rate of speed on Lake Simcoe is calculated at six miles per hour, on the summit three miles, and two miles on the other levels. Nearly twenty minutes is allowed for passing each lock

The comparison in time would be in favor of route No 2 The terminal harbor accommodation, being in favor of Nos 1 and 4, will give them a greater advantage, according to my judgment.

The comparison therefore will rest between these two latter routes. In point of time, then the difference is of no consideration; the principal and final objection to route No 1 would be the probable delay to sailing vessels passing through Lake Simcoe in consequence of adverse winds, to which No. 4 would not be subject.

Would this inconvenience or consequent expense be at all in proportion to the difference between the cost of the routes, namely, $1,500 000? I think not: and I am the more inclined to this decision from the certainty that the majority of the vessels passing through the canal would be propellers, which would not be affected by adverse winds: at least, it would not prevent their continuing their passage through Lake Simcoe or, in fact, from either terminus, except during very severe storms.

Under all the circumstances of comparison the route as originally proposed, appears to be the best, and I am not aware that any further local examination would alter this decision as, in every instance, I am satisfied that the most favorable locality was selected. In any comparison therefore with other or existing, or proposed, routes for the western trade the route from the river Humber west of Toronto, to Lake Simcoe, and from thence to Lake Huron, by the Nottawasaga river, will only be considered.

The estimated cost being	$28 170,750
The length	100 miles.
And the time	48 hours.

V — GENERAL COMPARISON WITH OTHER ROUTES.

The existing water communications between Lakes Superior, Michigan and Huron, and the Atlantic Ocean, are as follows:

No. 1 — By Lake Erie, Buffalo and Erie Canal.
No. 2 — " " Welland Canal, and Oswego and Erie Canal.
No. 3 — " " " and the St. Lawrence.

The projected water communications, as ship canals, are

No. 1 — By Lake Erie Welland Canal and St. Lawrence.
No. 2 — By Georgian Bay Toronto and St. Lawrence.
No. 3 — By " " Ottawa River and St. Lawrence.

To which may be added the proposed ship canal between the St. Lawrence Lake Champlain, and the river Hudson and from Oswego to the river Hudson Nos. 1 and 2 of the existing routes have New York as their sea port and No 3 Montreal and Quebec.

For the projected routes, New York, Montreal and Quebec would be the sea ports in case the projected ship canals between Montreal and Oswego and the Hudson river were constructed, and the St. Lawrence canal enlarged.

Chicago being the center of internal commerce at present, will, in every comparison, be made the starting point, and vice versa.

The city must be selected as the starting point from the west, for obvious reasons. The rapid growth of Chicago in all those elements which constitute a great commercial and enterprising city, indicating as it does, a prosperity and progress unparalleled in the commercial history of the world, justifies the well earned title of the "Center of Western Commerce."

The cities of Milwaukee and Superior also Waukegan Kenosha, Sheboygan and Green Bay are proportionably interested in the construction of this additional avenue for their trade and will no doubt unite with Chicago and Canada in ensuring its accomplishment.

A division of interests in advocating the construction of other channels for western trade, until this is completed, would be fatal to the success not only of this project, but of all others which are designed to facilitate the transit of western commerce

Comparative Distances and Estimated Time of the Existing and Proposed Routes

FROM CHICAGO TO NEW YORK.

No	ROUTE.	DISTANCE IN MILES.			Locknage, height in feet.	TIME IN HOURS.				REMARKS.
		River and Lake	Canal.	Total.		River and Lake	Canal	Lockage	Total	
1	Buffalo, Erie canal and Hudson river	1 241	504	1 918	592	166	121	17	304	The distance from Chicago to Buffalo, is taken at 1 100 miles, and from Chicago to the Georgian Bay at 600 miles. See report on Ottawa route, W. Shanly, C. E.
2	Welland Oswego canal and the Hudson river	1,471	227	1 898	1 046	178	79	26	289	
2	Welland Champlain canal and the Hudson river	1 632	164	1,846	953	210	57	16	281	
4	Georgian Bay Toronto, Oswego and the Hudson river	934	286	1 310	1,310	115	95	34	244	
3	Georgian Bay Toronto, St. Lawrence and the Hudson river	1,503	318	1 419	903	190	51	23	244	
3	Georgian Bay Ottawa and the Hudson river	1,078	300	1,378	924	193	100	23	316	

FROM CHICAGO TO QUEBEC.

1	Welland and St. Lawrence river	1 603	71	1 764	932	190	24	13	226	For comparison of distances. See Board of Works (Canada) Report, 1877
2	Georgian Bay Toronto and St. Lawrence	1 116	120	1 236	905	140	40	20	200	
3	Georgian Bay Ottawa and St. Lawrence	979	210	1 185	681	129	70	17	216	

N. B.—In the above tables, for steam propellers, eight miles an hour is allowed for the rate of speed on the river and lake, three miles an hour on the canal, and one and a half minutes for every foot of lockage.

New York to Liverpool, 2 880 miles; Quebec to Liverpool, 2,502 miles; difference in favor of Quebec, 378 miles.

By the above table of comparative distances it will be perceived that the Toronto and Georgian Bay Canal would not only be the shortest of existing or proposed routes in distance, with one exception, but allowing for the increased lockage, would also be the shortest in point of time, whether New York or Quebec is the seaport. By a comparison with the shortest of existing routes to New York, namely Buffalo Erie canal and Hudson river, the Toronto Georgian Bay and Oswego route would be 405 miles and about four days shorter in point of time, allowing fifteen working hours for each day during the season of navigation.

Also by comparing the Welland and St. Lawrence to Quebec with the Toronto Georgian Bay and St. Lawrence the latter would have an advantage of 428 miles in distance and save over three days. In the above calculations the detention in passing the St. Clair Flats are not taken into consideration, which, according to the argument in favor of the construction of the Rondeau and Chatham Ship canal, averaged six days for each trip, or three days either way. The average annual losses to ship ping at this point alone irrespective of detention has been calculated at $1 000 000, which would be so much saved and in favor of the Toronto and Georgian Bay route. On this basis a comparison may be formed between the above and any of the other routes, and in every instance it will be found to be still more favorable.

The difference, also from Chicago to Liverpool by the Georgian Bay Toronto and Quebec, is 452 miles less than by Toronto, Oswego and New York and 857 miles than by the present route by Buffalo Erie canal and Hudson river.

If it is admitted that the time has now arrived when Ship Canals must be constructed to connect the great lakes with the Atlantic Ocean, then the Toronto and Georgian Bay route possesses still further advantages over all others existing or projected. The expense and difficulty of deepening St. Clair Flats from 8½ to 12 feet, and it may be added, impracticability except at a considerable expense, would be an effectual barrier which could only be removed by the construction of the Rondeau and Chatham Ship Canal at this point, at an estimated cost of $6,000 000. The proposed lateral cut to the Welland Canal has also been estimated at $6,000 000. There we have a proposed expenditure of

$10 000 000 of Canadian capital, which if expended in the construction of the Toronto and Georgian Bay Ship Canal would leave but $12 000 000 to complete a work which would save 438 miles by the Quebec route, including the hazardous navigation on Lake Erie which is admitted to be the most disastrous compared with all the other lakes.

The tendency of the construction of the Rondeau and Chatham Ship Canal, the most feasible and economical method by which the navigation of this portion of the St. Lawrence can be improved, would be to facilitate the existing trade to and from Buffalo and the Erie Canal—the proportion of the increase of trade to the Welland Canal and St. Lawrence could hardly be expected to be at all commensurate with the cost of the undertaking as far as this Province would be concerned.

Since 1847, when the rivalry for the carrying trade of the great west was fairly begun between Canada and the State of New York," the expected trade by the St. Lawrence has been gradually diminishing in comparison with the Erie Canal. During the approaching season the enlarged Erie Canal will offer increased facilities for western traffic and the trade of the St. Lawrence will be still further reduced. It has been truly remarked that "all the canals railways and other means of communication that can be made across the Canadian peninsula for the next twenty years will not afford sufficient accommodation for the gigantic increase of the commerce of the great West. Admitting the truth of the above remark it would be inconsistent to oppose any of the projected improvements either by Buffalo or Montreal, but the superior claim that this route has on Canadians should be first considered, and our energies directed to its early completion If its construction will restore the trade to the St Lawrence that has been lost, then we ought firmly to protest against Canadian influence and capital being expended on rival projects.

With respect to the capacity of the proposed Toronto and Georgian Bay Canal, in comparison with those of existing routes, it will be conceded at once to be superior in every respect.

The passage of 50 vessels per day of 1000 tons each or 10,000 000 tons in 300 days which is the estimated yearly period of navigation, would meet the requirements of the trade for some years to come, while the present traffic about 6 000 000 tons is quite as much as the Erie Canal can conveniently accommodate.

and the annual increase will continually demand further enlargement until at length a ship canal of the proposed dimensions in this locality will be required.

Instead of this questionable method of occasional enlargement, the most expensive that can be adopted would it not be more advisable to construct additional avenues, thereby creating increased facilities for internal transports? Thus, under all circumstances, would appear the reasonable conclusion, and which, it is to be hoped, will yet be arrived at by all parties interested.

VI.—COLLATERAL ADVANTAGES.

The direct advantages that will follow the construction of the Toronto and Georgian Bay Ship Canal in opening a shorter and more expeditious route between Lakes Superior, Michigan and Huron and the Atlantic Ocean has been argued in the foregoing general comparison of routes.

The collateral advantages may be considered as being of a strictly local character though their connection with the main project will become more evident as an auxiliary when the work has been completed.

According to the calculations of the available water supply it has been computed at 40 000 cubic feet per minute thus supply from the summit to the north and south would be augmented by the rain fall of the water sheds of the Humber and Nottawasaga rivers, which is computed at 82,000 cubic feet per minute making a total of 202,000 cubic feet per minute, or 80,000 cubic feet for the southern or Humber portion and 112 000 for the northern or Nottawasaga water shed.

These quantities multiplied by the height, 150 feet for the northern, and 470 feet for the southern would give the available water power of each, an unfailing source of considerable profit, being in the vicinity of a populous city and of incalculable value for manufacturing and mechanical purposes.

CONCLUSION

In order to convey a clear idea of the position and advantages of the proposed canal, lithographed plans and profiles are now in

course of preparation having been reduced from the original plans and profiles which accompany this report.

The first map will represent the united counties of York and Peel, and the county of Simcoe on which the proposed routes are indicated. The second plan will contain reduced profiles of the routes, and the position and number of the locks.

The last will be a prospectus map, showing the general position of the proposed ship canal to connect Lakes Huron and Ontario at Toronto, in reference to Chicago New York and Quebec, with the existing and proposed routes and comparative distances before mentioned.

As soon as Col. R. B. Muter's report is completed it is proposed to have it printed together with this report, appendix, and plans attached so as to present the whole in a complete form, and convey the requisite information in as concise a manner as possible, consistent with the importance of the project.

The advantage of having a correct representation of the topography of the country lying between this city and Lake Huron, with the lines of the water sheds of Lake Simcoe and the Humber and Nottawasaga rivers will be evident on the inspection of the plans, and has influenced the committee in incurring this additional outlay, which they feel certain will be reimbursed.

The estimated cost of this undertaking will at first appear considerable but on consideration of the immense advantages that will result from its construction, in comparison with the other public works not yet completed in this Province and the United States, will on serious reflection justify the expenditure of a much larger amount than may have been anticipated when the project was first contemplated.

The cost of the Grand Trunk Railway when complete, including that superior engineering work the Victoria Bridge at Montreal, has been estimated at $40 000 000 more than double the estimate cost of the canal. This railway, extending from Portland to Stratford a distance of 714 miles, the remaining portion between Stratford and Sarnia, 70 miles, is expected to be completed this year in connection with a railway across the peninsula of Michigan, thereby forming another link between the Atlantic and Great West. The cost of that railway has ceased to be considered a serious matter in comparison to the anticipated advantages; it is now an established fact, the voice of the Legislature having stamped it a national undertaking and as such deserving the active and zealous

support of the Province generally, to which it has already been undoubtedly of incalculable advantage by increasing the facilities of communication it has promoted the agricultural and commercial interests of the community, in some instances more than quadrupled the value of real estate, and laid the foundation of future prosperity and independence.

If these are worthy objects of ambition to a new country like Canada, they should be upheld by the unanimous voice of the Province: if not, let us retrograde to our log shanties, cordu roads and antiquated conveyances. By way of contrast, I would mention that the journey between Toronto and Cobourg which was formally warranted to be through by day light, a distance of 75 miles, occupied 24 hours in its accomplishment, under difficulties of no ordinary description; to this I can personally testify having "gone through by daylight" by road, and duly arrived next morning about the same time at which we started the previous morning. Thus occupied in the Autumn of 1847, last Autumn I traveled to Cobourg and returned the same day in seven hours having seven hours to spare for the transaction of business, and went "through by day light" in reality not by fiction.

The immense traffic on the Great Western Railway during the Autumn of 1856 [last year can hardly be considered even an average by which this travel can be estimated] would impress a careful observer with some idea of the extent of the western trade. This railway was also constructed as an additional avenue, and its success as a profitable speculation is undoubted and its advantages fully admitted by the stockholders. Several other lines are projected to pass through Canada, as competitors with the above-mentioned railways and on the south shore of Lake Erie in connection with the Michigan Central Railway also commands a large share of western traffic. These remarks may be considered foreign to the subject, but in every instance they are forcible illustrations of the magnitude of the western trade. It is needless here to refer to the extent and prospective increase of that trade it is well understood and appreciated by those who are interested in its developements; it will be considered sufficient to remark and it is not unreasonable to suppose judging by the past, that before the Toronto and Georgian Bay Canal can be constructed, the trade of the west may demand a superior capacity of locks and greater facilities than those at present contemplated. The retention of

the trade of the west by the Erie Canal, notwithstanding the continual expenditure and additional facilities annually afforded by the St. Lawrence route, is forcibly commented on by the Hon. John Young in his letter to the Hon. F. Lemieux, Chief Commissioner of Public Works. He states:

"It would be easy to multiply facts to establish the same general results, but the figures above given will sufficiently show that which we can neither deny nor controvert, namely, *that the trade in the lower St. Lawrence, in the produce of the West, is paltry and insignificant compared with what it ought to be, and compared with that by the Erie Canal*—that our present facilities for transportation, property are wholly inadequate to secure successful competition with the more southern route. It is in vain to overlook or undervalue the result, it is forced upon us every year more and more plainly, and was foreseen by every intelligent merchant acquainted with the Western business, and is corroborated by other facts."

In the latter part of 1875 the route by the Ottawa was procured as a panacea for the sickly trade after the proceedings in Toronto had become public. Lake Nipissing, the proposed feeder of the Ottawa Canal being two degrees further north than the northern terminus of the Toronto and Georgian Bay Canal, the period of traffic each season of navigation on the Ottawa route would be diminished at least 14 days in the spring and autumn, or one month on an average, and to this may be added the inconveniences of a close navigation for 430 miles, between Lake Huron and the St. Lawrence as contrasted with 77 miles by this route. For these reasons, as I a want of sufficient data in other respects a comparison may be excused. The terminus of the Ottawa route on Lake Huron will be too far north to compete with the Erie Canal, and on the contrary, the Welland Canal is too far south. The Toronto and Georgian Bay Canal, being in a direct line between the direct points of traffic, namely, New York on the south-east, and the junction of the three lakes, superior, Michigan and Huron, on the north west, would if constructed possess superior advantages in this respect. In the 'Prize Essay' on Canada, written by J. S. Hogan, Esq., M. P. P. for the county of Grey, the comparison between the facilities of the St. Lawrence and Erie Canal routes is so clearly described that it is thought advisable to copy it in full, by permission.

"Measuring the St. Lawrence then as a highway to the ocean, by the standard that if it can be superseded by more rapid cheaper or more convenient routes, it cannot be successful. If it does not fall into disuse, what are its future prospects?

"The first thing that strikes one in contemplating it, is its adaptation in point of immensity to the vast regions it waters. Whilst the business necessities of the West, and those portions of America which are universally admitted to be, both by their relative position to other rivers and to it, its natural feeders have literally shamed the enterprises that were intended to provide for them, its vast magnitude and its value are being but discovered by the contrast. The Erie Canal, highly valuable as a work, and successful beyond comparison *has been made little by progress.*

"The St. Lawrence on the contrary only reqe res enormous use to test its greatness. It is impossible, indeed to contemplate this river in connection with the canal that was made to rival it, without being struck with the inadequacy of the one and the magnitude of the other

"The valleys and plains watered by the St. Lawrence being largely in the United States, have chiefly contributed to the Erie Canal's business. Their fruits were literally wrested away from their natural channel to minister to its prosperity. The St. Lawrence in so far as American policy and great restrictions upon commerce, could affect it, has been sacrificed to the Erie Canal. Nature's outlet had any gotten laws which drove commerce away from it, to contend against. The Erie Canal had all these disadvantages to the river converted into advantages in its favor. Yet the laws of progress which have swept away the obnoxious navigation restrictions, have, at the same time established the failure of the Erie Canal. Not that it is unprosperous as an enterprise, nor that, *as a local work*, it is not unsurpassed as a speculation, but that, for the great purposes of its construction namely to convey to the ocean the fruits and productions of the West and North west, it is emphatically a failure, *because progress has completely overburthened it, it is literally surfeited by its own prosperity.* And it matters not to him—an every day man in such a case being the nation—who has boards or flour to send eastward by it, whether they are stopped by reason of starvation, or because of a surfeit. The unpaid rent to his business is the all important question with him. And though the Erie Canal paid

larger profits than any other work in the world yet, as a national point of view, if it sufficed not adequate facilities for business, or stopped it in its course, it might, by drawing to it what it could not do be the means of wide-spread evil, instead of general good. And that this is, to a great extent the present position of the Erie Canal, is universally admitted.

"To obviate these difficulties, enterprise has undertaken to swell its dimensions to meet the enormous demands of *progress*. But in view of the vast regions which are common alike to it and the St. Lawrence, and which are as yet but in the infancy of their population and business is it not probable may, is it not certain, judging by the past, that twenty years hence will find the Erie Canal again choked up with business—again *made little by progress?* When the magnificent tracts of country embraced in Michigan, Wisconsin, the northern portion of Ohio and Indiana, Illinois, Iowa, Minnesota, and the west and north west portions of the State of New York, which now wholly or largely use the Erie Canal as a highway to the ocean come to be settled up, and to have, instead of some five or six millions of inhabitants as at least eighteen or twenty, what *were canal* with its hundred locks and its hundred other impediments, will be equal to their vast business necessities? will be in keeping with their splendid progress? will satisfy their craving for rapidity, magnitude and commercial convenience? Will not the Erie Canal *then* enlarged though it be, be but another added to the numerous examples in America, *of progress utterly distancing enterprise, and prosperity shaming the calculations even of talent.*"

Are any further arguments necessary after this above almost prophetic demand for an additional and enlarged avenue for Western trade, which cannot be surfeited by progress?

As a demand for improving and developing the mighty resources of these inland seas, the above arguments are not only unanswerable, but, on reflection, will be admitted to be incontrovertible.

Before concluding this Report, I would select this as the most fitting opportunity of thanking A. M. Ross, Esq., George Tait, and Walter Shanly, Esq., Civil Engineer, connected with the Grand Trunk Railway for important statistical data and other information, Thomas Ridout and S. Fleming, Esqrs. Engineers of the Great Western and O. S. and H. Railways, for the use of plans, also to F. P. Rubidge, Esq., of the Board of Public Works,

and Thomas Devine, Esq., of the Crown Lands Department, for the valuable information afforded by them thereby facilitating my professional labors and placing reliable data within reach, which could not otherwise be procured, without incurring further labor and loss of time, and entailing additional expense.

I have the honor to remain,

Your obed ent servant,

KIVAS TULLY.

THOMAS CLARKSON, Esq.,
President of the Board of Trade,
Toronto.

APPENDIX A.

LETTER FROM R. A. ROYS, ESQ

"In regard to any prospective advantage for freight, I think you might mention the immense quantity of pine timber on the north shore of Lake Huron. Already large locations have been taken up, and extensive mills will be immediately erected. The description of mill about to be erected will make 30,000 feet per day which, for each mill, will make 18,460 tons per season, allowing one and a half tons per M. which is low. There will soon be about ten or three mills in operation making annually 184,600 tons of freight; and with such encouragement as direct shipping to Liverpool the West Indies, etc. the annual price of Lake Huron alone would employ 460,000 tons of shipping annually. Double this freight of sawed lumber there are the vast white oak forests. It costs, at present, about $400 per thousand feet to take square white oak from the north of Lake Huron to Quebec, which is certainly a prohibition of trade, could it be shipped direct, one quarter of that sum would pay the extra transport, making an enhanced value for the timber on Lake Huron of two hundred per cent.

"With such a prospect, the amount of timber that would be manufactured can scarcely be calculated. But I should say that Canada alone, on Lake Huron, would require at least one thousand vessels, of one thousand tons each, to carry off her manufactures of sawed pine square pine, both red and white pine masts and spars, square oak staves, etc. etc. Besides, what a trade would immediately spring up in ship building. What better place could be selected for the purpose than the deepened outlet of the canal on Lake Huron (Nottawasaga river). At the mouth of this river is a deep reach of three and a half miles long where one hundred or two hundred of the largest class of ships might be built at one and the same time and, when built and afloat, they could be in perfect security.

"The timber for manufacturing them, both white oak white and red pine timber, spars and masts, can be cut up the river, where there are some thousands of acres of these timbers, of the finest quality which can be floated down to the ship yards with the greatest ease.

"Besides this is only a small item in the prospect for freight. The great west in the country from which the bulk of freight must come. When we see what the making Lake Huron a part and parcel of the Atlantic is going to do in the way of freight, what must we expect from Lake Michigan and that great and almost unexplored inland sea, Lake Superior?

"The question that the ship canal would give to the timber, mineral, fish and grain manufactories, would be incalculable. It would be the opening up to commerce of a new world, a ready opening with life, and ready to manufacture to any amount, so long as there is a demand, as the supply of the above named articles, namely, timber mineral, fish and grain, and of the best description, being practically inexhaustible."

APPENDIX B.

THE TORONTO AND GEORGIAN BAY CANAL.

TORONTO January 30th, 1858

DEAR DOCTOR,

As the Report on the Toronto and Georgian Bay Ship Canal will soon be published I would feel obliged by your stating any particulars with which you may be acquainted in reference to the same, for the purpose of public information being assured that for several years you have taken an active interest in its promotion, as its great projector

Believe me to remain, yours very truly

KIVAS TULLY

WM. KING, Esq., M.D., *Toronto.*

TORONTO, January 21 1858.

DEAR SIR,

In reply to your note desiring any particulars I may possess with reference to the Georgian Bay Canal, I have only to state, after having perused your valuable report, together with the opinion of Cn Mason, Con E. one of the highest authorities in the United States, that anything I could communicate must be of very little value. I may however observe that having made several explorations subsequent to calling public attention to the project through the columns of the *Courier* in 1846, that I feel the more convinced of its practicability whilst the rapid strides annually made, both in Canada and the western States, had I conceive, fully proved the justice of my numerous and very urgent appeals to government on that occasion, but recently with reference to the above, but also as to the claims of other important parts of the country to examination, in the direction of the Trent,* Ottawa, and Bay of Fundy with views to perfecting the St. Lawrence navigation, from our vast inland seas to the Atlantic also to affording greater encouragement to emigration and settlement, that it must be admitted that the fertile shores of Lake Huron, and the rich valleys of the Ottawa and St. Maurice have been judiciously laid out as the

* On the suggestion of mine, Sir John Colborne did cause an examination of the chain of lakes between Lake Simcoe the Trent and Mohawk, connecting with the Ottawa, which resulted in the construction of certain locks, dams and other partial improvements.

period referred to, our population commerce and revenue, might have been nearly double what they are at present, and it cannot be doubted that, on the settlement of the waste lands, the improvement of the St. Lawrence, together with the sea ports of Quebec and Montreal, mainly depend the future advancement and prosperity of this country.*

Thus our internal navigation will never be perfect or commensurate with the requirements indicated by the progress of the last few years, and that it is merely a question of time (however absurd the idea may appear), when both the Georgian Bay and the Ottawa Canals shall be constructed, must be sooner or later universal adjunct. By the former vessels descending would have the advantage of the lake navigation, most profitable winds and currents to the water below Montreal, where they would arrive in the time at present occupied to reach eg Buffalo. By the latter or Ottawa canal upward bound vessels would have the benefit of an inland, well-situated and more direct route to the head of the Georgian Bay whilst at the lower St. Lawrence a further improvement may be effected in the saving of from 500 to 600 miles, by means of a short canal at the head of the Bay of Fundy, thus throwing open the entire American and Colonial seaboard, and perhaps, at the same time, supplying the advantages contemplated by the proposed Champlain route, Chicago and other ports at the head of Lake Michigan and Lake Superior being thenceforth found to the commercial world.

To the St. Lawrence as the natural outlet of the great lakes and the region west belongs the trade is universally admitted that with the advantage of being one-fourth the distance nearer Europe, together with the small rise presented for its improvement, the trade cannot longer continue to take the more southern channels, than will the above improvement shall have been effected must be equally evident.†

Persevere then with the light heart and self reliance of a Canadian voyageur who knows no obstacle persevere in the great enterprise, and success is certain The hope, the majesty of Canada is in her highways as the basis of her national wealth, as in her agricultural, her domestic industry and her commerce.

Bold, comprehensive and enlightened legislation consonant with the spirit of the age, and in which the enterprise energy [illegible] ion with the Canadas cannot long be protracted), should be invited to co-operate, is imperatively demanded.

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* If Victoria an extensive floating dock has become an essential at Montreal as the Victoria Bridge, whilst the filling up and destruction of that noble harbor, once the pride of Quebec, should at once be prohibited, substituting for it a ballast ground, through the mud ips of Lachine, the river St. Charles, a simply basin of floatlanding, at the same time, the extensive, north-easterly of the Basin (long a disadvantage) to that important city

† In having been ascertained that the finest and most improved quarries exist on certain islands in the vicinity or immediately on the line of the proposed canal it may appear worthy of such alteration how far, under such advantages, to be most parts of Europe, convict labor may not be employed

‡ In connection with the above the Halifax and St. Johns Inter-colonial Railway both of which must assume or later be constructed thereto attention and it would be well if the Governor of New Brunswick at once sought the possession of the island [illegible] port of the St. Johns River by purchase, which is or no majority ruled by the Admiralty treaty a small matter since it territory of no great value or importance to the United States, but absolutely indispensable to the construction of St. Johns and Quebec Railway If properly represented to the United States government,

The vast and important appendages to the British Crown possessed of the most promising greatness, in the enjoyment of every institution essential to intellectual and social development, with one of the most practical forms of government that has ever existed protected and fostered by the most widely extended and powerful empire the world has ever seen should fill every heart with exultation and pride, and prove the most powerful incentive to energetic action, or lengthen out existence *

I am truly yours,

WM. REES.

KIVAS TULLY, Esq.,
Chief Engr. Toronto & G. B. Canal,
Toronto.

considering the very great economies made by Lord Selkirk's, both in the settlement of the north-western boundary as well as in the settlement at the north-eastern boundary no doubt but that it would be questioned at a like valuation. Almost of equal importance to Canada, is that also comprised between the St Louis and Red rivers as the head of Lake Superior.

6 An installation of progress the population of the North-west is already set down at 16,000,000. the 4 ty 6 millions 180,000 Cincinnati, in previous yielded in slaughtered cattle a year, during the last year $3,500,000, and grain from all parts in proportion Lake Shipping 80 to 100,000 barrels. Whilst there are more than four for railways projected showing that the great Ro egress highway a price worth considering for $3,000,000, which as many saved a load and the lake of 9,000 vessels would accomplish the work in five years. And it may be our route at once to secure to the benefit of such undertaking, that amount of the Crown lands throughout the line Nor should any further than be lost by the government Surveys and roads throughout the Wild s of the interesting part of his country should be made Harbors and emigration depots should be provided, and thereby a more generally enlightened and liberal policy People we not to be allowed an opportunity of redeeming ourselves from the stigma of a late Lieutenant-Governor at that time interfered, carried loudly that no population was not that at the parish of Manit le Lieu, the government that at an English Commissary our boundaries were not have established and lost public patrimony, our entry its and prosperity thereof to a glorious cross within the Westminster *Review* characterized the whole country on a worthless. Thanks, however to the great interest of a Provincial Board at Wasta, and parties to the circumstances of such a rebuke in general progress and an national welfare unanimously endowed will at the present period, will compare with these at the most forward of their countries whilst our great natural and commercial ad d tages gives superior to any in the whole of the continent. Then let our Provincial represents fare be made sensible, that the greater interests of the country lie a little beyond the own doors or the mere frontier lines at an interest, and the real and material source of wealth rests not be developed and are to be mainly sought in opening up existing the internal great thoroughfa s of distant shores, and which will be found as picturesque and fertile as the valleys of the Hudson and Mohawk, of Switzerland in the extent and magn ficence of water power Tennessee, however in securing the confidence of capitalists, and interest in responsible emigrants be one o ects, the great have adopted must not be overlooked. Sectional jea ousies and conflicting party feuds and party proceedings, as are inimical to the peace and prosperity of a new country as they are degrading to the whole community and shed, if an appeal to the great power, public and public into o the people, be by mutual consent forever extinguished The mere compact and a decision at a ce with our maritime provinces the Inter-colonial Railway and Ocean Mail service, when received in connection with our accessions to the North western territory and the various American projected railway notice to the Pacific cannot fail to favourably awaken its attention of the imperial government to what has long been formulated the establishing at no distant period of a rapid Pacific postage and it would be an enterprise worthy the Hud n's Bay Company considering their deep interest and intimate knowledge at their lobby concerning country at once to plan out as the south branch of the noble Saskatchewan, the foundation of a great central city of the North-west, which would doubtless be followed by a great military as governmental high road

APPENDIX C.

Meteorological Mean Results at the Toronto Observatory.

MONTH.	Mean Barometer.	TEMPERATURE.				SOLAR RADIATION.		RAIN.		SNOW.	Total Amount of Sunshine recorded.	WIND.			
		Mean.	Mtc.	Min.	Range.	Max. Temp.	Min. Temp.	Amount.	Days.	Amount.		Resultant Direction.	Resultant Velocity.	Mean Velocity.	Mean Pressure.
	Inches.	Deg. Fah.	Deg. Fah.	Deg. Fah.	Deg. Fah.	Deg. Fah.	Deg. Fah.	Inches.	No.	Inches.	Hrs.		Miles per hour.	Miles per hour.	Lbs.
January	30·030	25·05	29·71	20·39	9·32	34·54	15·84	2·09	11	6·70	82·4	S.W.	7·28	9·18	0·18
February	30·150	23·68	29·71	17·65	12·06	34·54	12·84	1·45	8	5·40	111·4	W.	7·28	9·18	0·18
March	30·071	33·03	39·03	27·03	12·00	46·03	20·03	2·03	11	4·00	141·6	W.	7·28	9·18	0·18
April	30·073	44·03	51·03	36·03	15·00	59·03	29·03	2·03	11	0·00	201·6	W.	7·28	9·18	0·18
May	29·965	54·03	63·03	45·03	18·00	72·03	38·03	2·03	11	0·00	251·6	W.	7·28	9·18	0·18
June	29·965	63·03	74·03	52·03	22·00	84·03	45·03	2·03	11	0·00	301·6	W.	7·28	9·18	0·18
July	29·965	68·03	78·03	58·03	20·00	88·03	51·03	2·03	11	0·00	351·6	W.	7·28	9·18	0·18
August	29·965	66·03	76·03	56·03	20·00	86·03	49·03	2·03	11	0·00	401·6	W.	7·28	9·18	0·18
September	30·071	58·03	69·03	47·03	22·00	79·03	40·03	2·03	11	0·00	451·6	W.	7·28	9·18	0·18
October	30·071	47·03	58·03	36·03	22·00	68·03	29·03	2·03	11	0·00	501·6	W.	7·28	9·18	0·18
November	30·071	36·03	46·03	26·03	20·00	56·03	19·03	2·03	11	0·00	551·6	W.	7·28	9·18	0·18
December	30·071	26·03	34·03	18·03	16·00	44·03	11·03	2·03	11	0·00	601·6	W.	7·28	9·18	0·18
Mean for	30·0599	44·85	53·71	35·99	17·72	64·51	28·51	24·09	131	16·10	3,501·6	W.	7·28	9·18	0·18
DATE.		Mean of 12 Years.	Mean of 12 Years.	Mean of 12 Years.	Mean of 12 Years.	Mean of 12 Years.	Mean of 12 Years.	Mean of 12 Years.	Mean of 12 Years.	Mean of 12 Years.	Mean of 12 Years.	Resultant Direction of 12 Years.	Resultant Velocity of 12 Years.	Mean of 12 Years.	Mean of 7 Years.

APPENDIX D.

GEOLOGICAL DESCRIPTION

By reference to Sir William Logan's map, illustrating the physical structure of the Western District of Upper Canada, it will be observed that the proposed canal, commencing at the Thunder Bay situated in the Huron River group, crosses the line of division between the and the Ozon slate about twenty-three miles from Lake Ontario, and the line of division of the Trenton limestone thirty-three miles from Lake Ontario, comprising the "Ridge" in King. Route No. 1 continues in this group to the mouth of the Nottawasaga River

The whole of the proposed routes pass through the lower silurian formation, except fifteen miles of the northern portion of route No. 2, which crosses the line of division between the lower silurian and Laurentian series of the Geological survey

Route No. 2 would also commence in the Huron river group, crossing the lines of division of the Utica slate and Trenton groups forty and fifty miles from Lake Ontario respectively and terminating in the latter group to the mouth of the Nottawasaga River

In Sir William Logan's paper on the physical structure of the Western District, etc., published in the August number [1864] of the Canadian Journal, the position which prima to this locality is as follows

"Taking these rocks in the general groupings I will be perceived by the map that the lower silurian series, by a change in the strike from west to north-west, sweeps round from Lake Ontario to the Georgian Bay and proceeds thence by the north side of the Manitoulin Islands and the one is above of Lake Huron to the northern peninsula of Michigan, gradually curving to Green Bay in Lake Michigan The upper silurian follows them. The Niagara limestone at the base sides in forming the neck of land separating and holding up Lake Erie and Lake Ontario, as it continues in a ridge along the Blue Mountains, and the promontory terminating at Cabots Head and Cape Hurd, of which promontory the chain of the Manitoulin Islands is only an interrupted prolongation."

The Hudson river group is exposed in front of the new garrison west of Toronto, during the lowest lake level and can be distinctly traced along the banks of the river Humber as far as Scarlet or the south side of the ridges, a distance of four miles, indicating an inclination of about twenty feet to the mile as that section on the north side of the ridges an trace of this group has been discovered along the line of survey

On Lot 24 in the 6th lon. of Albion township, a limestone crops out, which from good authority is stated to be a portion of the Trenton group of this in this case the line of division between the Trenton group and the Utica slate should be from eight miles further west than is indicated on the geological map, and the whole of the deep excavation in the township of King would be in the Trenton group.

As the Trenton limestone, where it crops out on the river St. Lawrence, is proved to be very suitable for building purposes, the locks on the St. Lawrence canals having been constructed with it extensively, the work on the excavation will be considerably lessened in quantity and as the limestone can be used in the construction of the locks, a considerable saving in the cost would be effected.

In connection with this question the following description of the subsidence of "drift" period as Sir Charles Lyell's Manuel of Geology page 186 will be interesting to the advocates of this important undertaking

From the distinct evidence of both sea and land in the surface of this district, corresponding with Sir Charles Lyell's description there can be no doubt but that the upper portion of the deep excavation will be through the "drift" described on the Trenton group, thereby reducing the *inexpressible* difficulties to them of time and money

"By the hypothesis of such a slow and gradual subsidence of the land, we may account for the fact that almost everywhere in North America and Northern Europe, the boulder formations rests in a polished and furrowed surface of rock, a fact by no means obliging us to imagine, as some think, that the polishing and groove formation was as a whole anterior in date to the transportation of the erratics.

"During the successive depression of this gradual varying regularly or height from zero to 5000 feet above the sea level, every portion of the surface would be brought down by turns to the level of the ocean so as to be converted first into a coast line and then into a shoal and at length, after being well covered by the strata lying upon it of thousands of icebergs, might be made to a depth of several hundred fathoms.

"By the constant depression of land the coast would recede further and further from the successively formed zones of polished and strained rock, each coast zone becoming in its turn as deep under water as to be no longer grazed upon by the heaviest icebergs. Such earliest areas would thus amply serve as receptacles of mud sand and boulders, dropped from melting ice, perhaps to a depth scarcely if at all inferior to that of the present day meanwhile during the formation of the unstratified and unfossiliferous mass in deeper water the unveiling and deepening of shoals and breaches is still going on elsewhere, upon and near the coast in full activity

If at length the subsidence should cease, and the direction of the movement of the earth's crust be reversed the modern area covered with drift would be slowly elevated into land

"The boulder deposit, before emerging, would thus for a time be brought within the action of the waves, tides and currents, so that its upper portion being partially disturbed would have its materials rearranged and stratified. Streams also flowing from the land would in some places throw down layers of mud upon the till. In that case, the order of superposition will be first and uppermost, sand, loam and gravel occasionally found fossil. Secondly an unstratified and unfossiliferous mass, for the most part of much older date than the present ag, with angular erratics or with boulders interspersed and thirdly beneath the whole, a surface of polished and furrowed rock."

APPENDIX E.

Magnitude of the Lakes from Disturnell's Trip Through the Lakes

NAME.	Area.	Length in miles	Greatest Breadth	Average Breadth	Coast Line	Depth in feet.	Elevation above the sea.	REMARKS.
Superior	35 000	430	160	63	1000	1000	626	The Sault Ste Marie Canal connects Lakes Superior and Huron. One of the locks, 350 feet long 70 feet wide..10 feet lift. Canal one mile in length.
Huron	23 000	280	110	70	705	300	574	
Michigan	21 200	280	82	36	358	600	672	
Erie	11 000	220	60	32	270	204	564	Welland canal connects Lakes Erie and Ontario 26 miles in length.
Ontario	6,200	150	35	40	210	600	234	High water 4 feet above lowest level.
Georgian Bay	6 000	140	35	40	210	600	574	" 4 " " "
Shanon	554	35	12	10	100	120	704	" 9 " " "
St. Clair	382	90	25	15	80	20 to 30	568	Annual loss at the Flats, $1,600,000, besides detention six days each trip.
Champlain	1 100	130	12	10	260	84 to 252	90	Chambly and Champlain canals connect the St. Lawrence and Hudson. Twelve miles and 66 miles long, respectively
Green Bay	1 000	120	25	14	250	100	674	
Nipissing	360	40	12	12	120	unknown.	648	

NOTE.—From Astronth Island to Fond du Lac, Lake Superior ..... 2,306 miles.
Coast line of the River St. Lawrence and Lakes ..... 3 687 "
Navigable tributaries of the St. Lawrence ..... 960 "

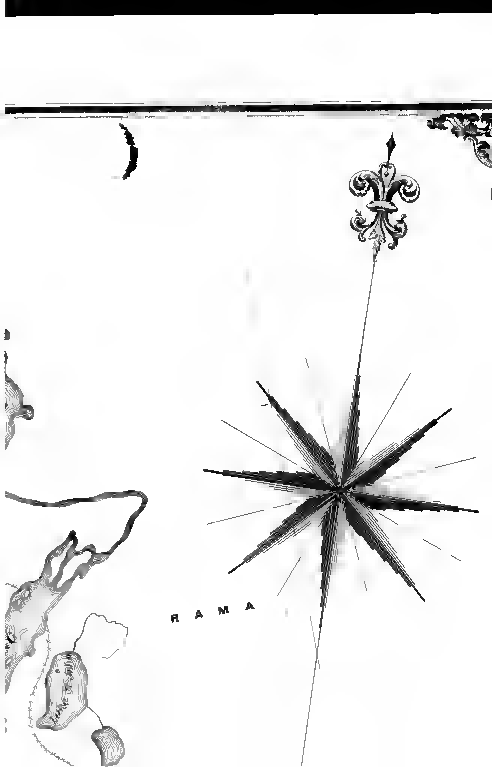
NOTTAW

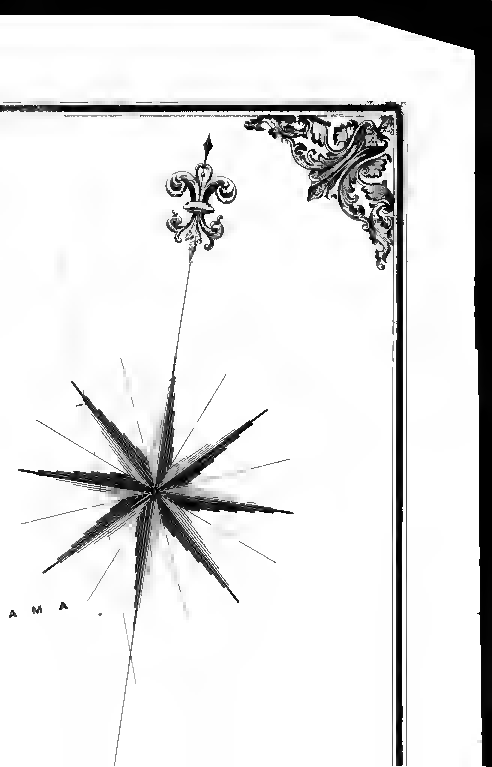
BA

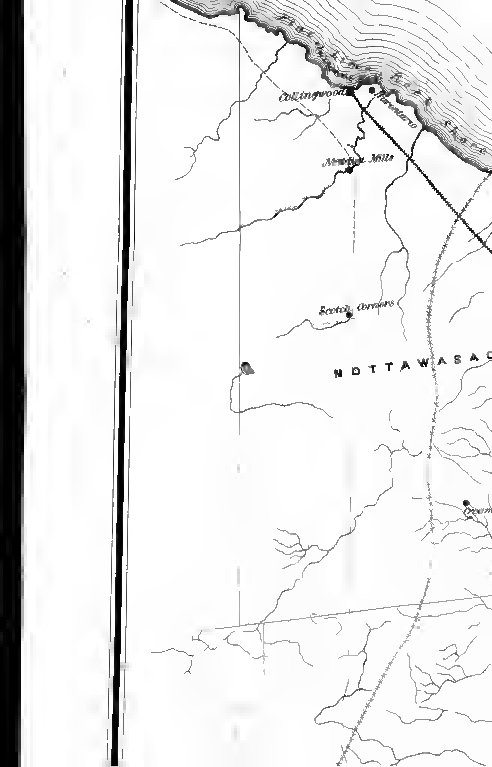
WASAGA
BAY
TINY

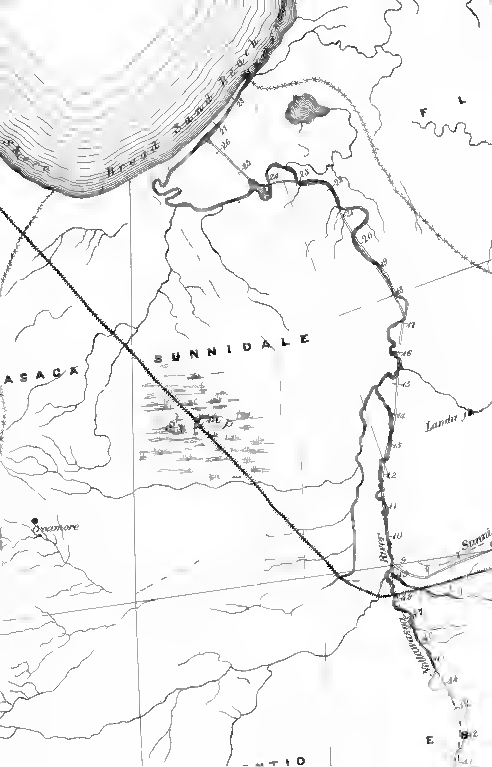
GLOUCESTER BAY
Penetanguishene Road
Penetanguishene
Garrison
Hen & Chickens
Beacon Point
Midland Point
Lafontaine
Penetanguishene
Penetanguishene Road
Penetanguishene Road
Penetanguishene Road

RIVER
SEVERN
MATCHEDASH
Route No 2
ORILLIA
Coldwater Creek


RAMA




Collingwood
Meaford Mills
Scotch Corners
NOTTAWASAG

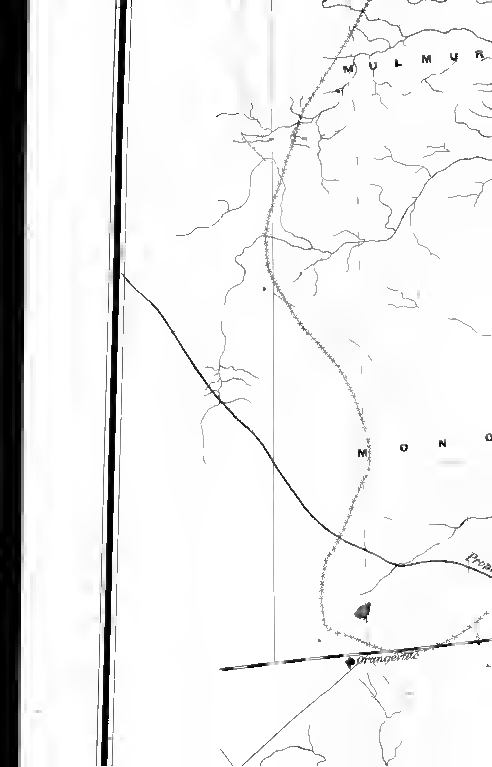

Great Sand Heath
SUNNIDALE
ASACK
Landir
Somb
Shimmering
E

Portage
Road
Scandale
Road
Rattle
Vale
Burrit
Kempenfeldt
KEMPENFELT BAY
INNISFIL

ORILLIA
SOUTH
Athenry
Bridge Road
L A K E
S I M C O
Bridge over Thorah
Beaverton

Athenry
MARA
E
O
E
Tuathe R.
Hoath
Hoathee R.
THOMA
Roads
GEORGINA
ISLAND

R A
THORA
Thorapark
Thorau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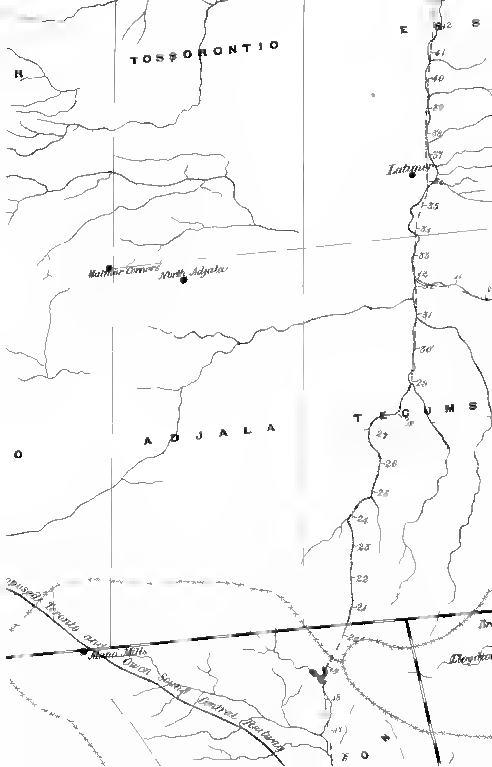
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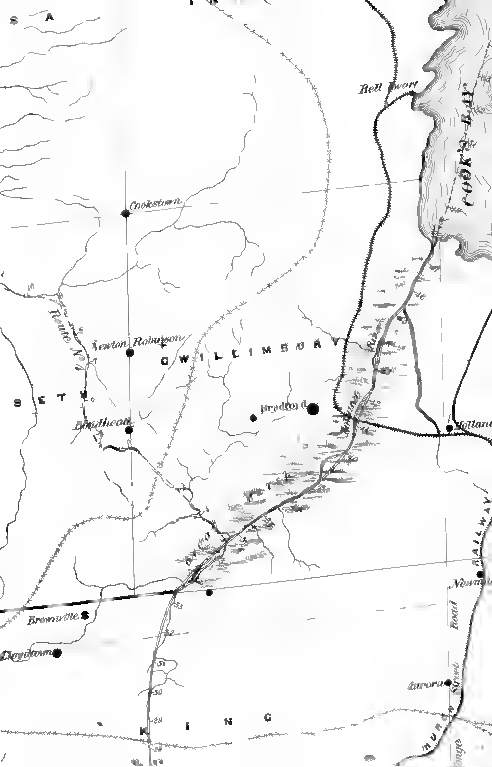
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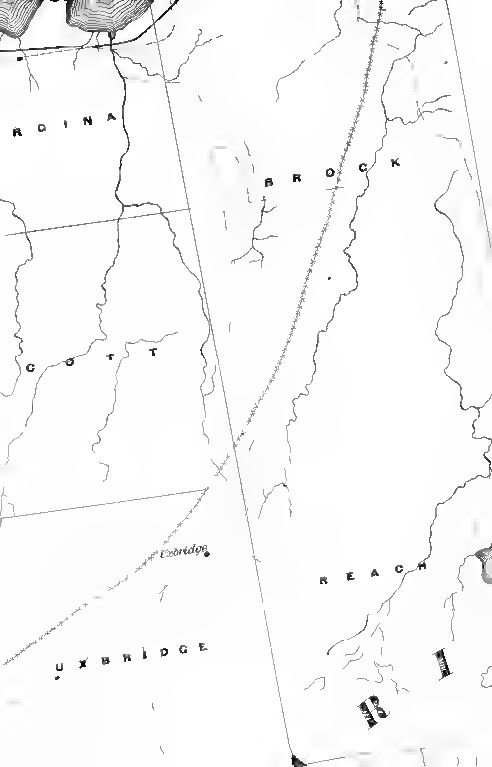
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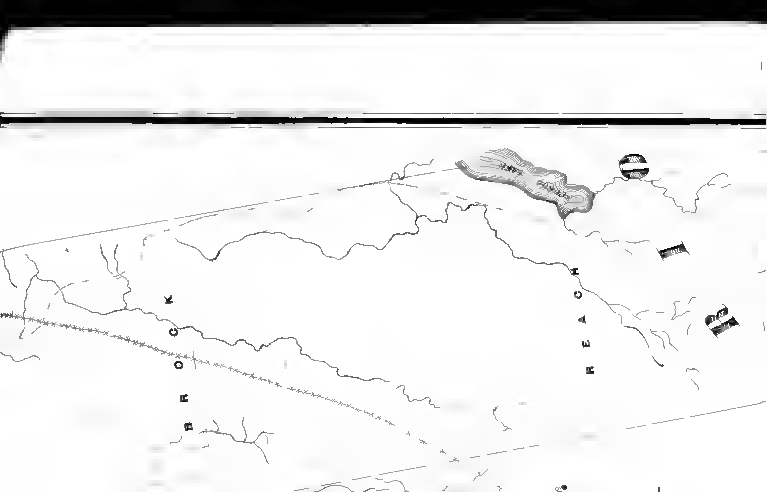
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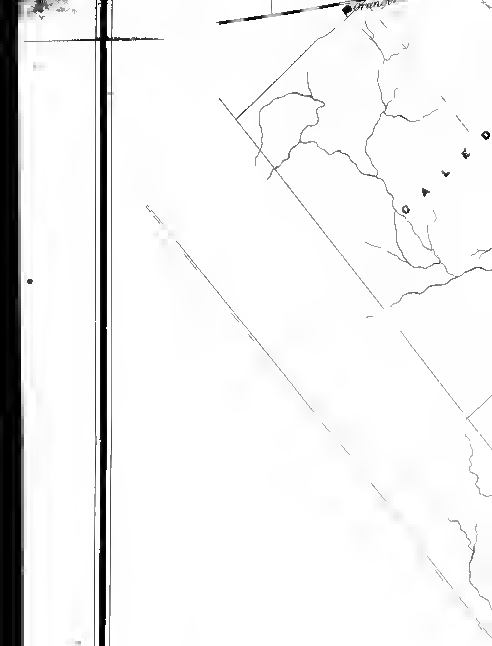

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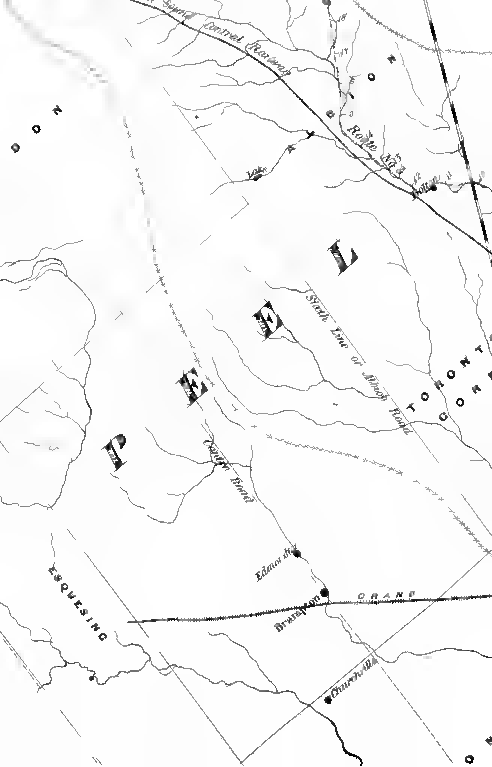
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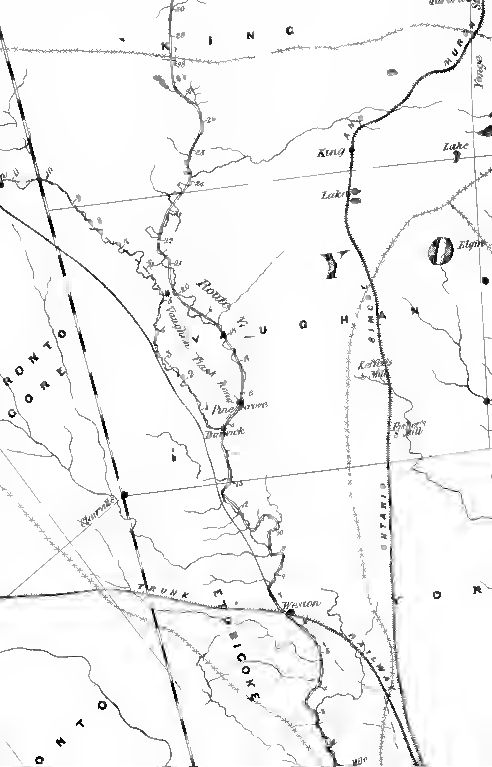
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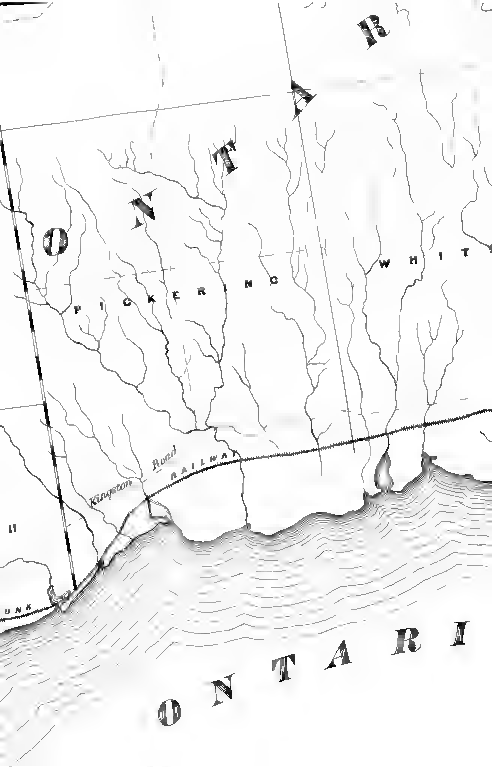
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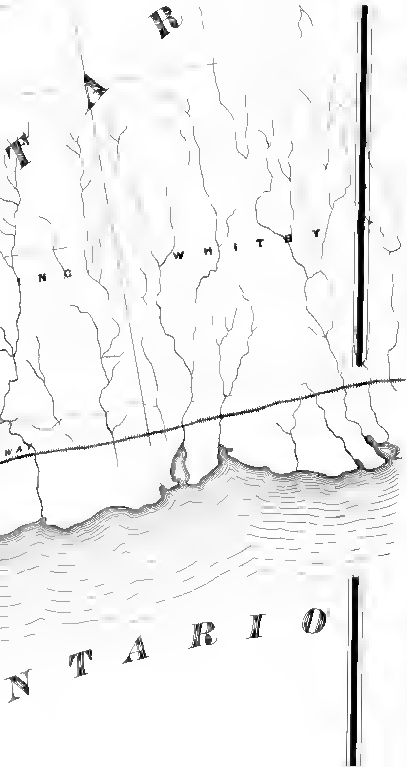
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REFERENCE

	CANAL	LAKE
Length of Route N° 1	77 miles	23 miles
" " " 2	65 "	33 "
" " 3	83 "	
" " " 4	84 "	

Lake Simcoe Water Shed	1200 Square miles
Nottawasaga River	1000 " "
Humber "	500 "
Don "	125

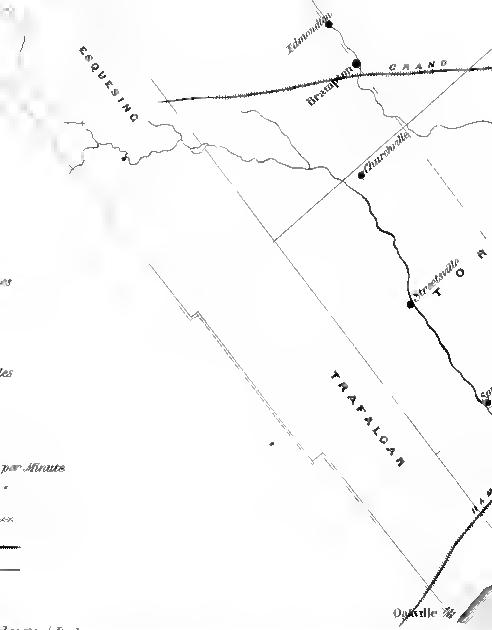
Water Supply from Lake Simcoe 60 000 C°Ft per Mi
" " required for the Canal 12 000 "

Lines of Water Shed Marked thus x x-x-x-x

Railways in Operation "

Projected "

Scale 2½ Miles to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TRUNK
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MAP
ng the Several Proposed Routes
OF THE
NTO & GEORGIAN BAY
HIP CANAL
Between the
TORONTO & LAKE HURON.
ULLY C E TORONTO
el Engineer
N E BASON C E CHICAGO
Consulting Engineer

N T A R I O

Proposed Routes

ORGIAN BAY

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the

& LAKE HURON.

R H MASON C E CHICAGO

Consulting Engineer

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THE GEORGIAN BAY CANAL.

REPORTS

OF

COL. R. B. MASON, CONSULTING ENGINEER,

AND

KIVAS FULLY, CHIEF ENGINEER,

TO AN

APPENDIX, PROFILE, AND MAP.

CHICAGO
DAILY NEWS CO. AND C. H. BLAIR & CO., CLARK STREET
1875

THE

GEORGIAN BAY CANAL.

REPORTS

OF

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KIVAS TULLY, CHIEF ENGINEER;

WITH AN

APPENDIX, PROFILE, AND MAP.

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CHICAGO.
DAILY PRESS BOOK AND JOB PRINT, 42 CLARK STREET
1858.

REPORT.

To GEORGE STEEL, THOMAS RICHMOND, *and* WILLIAM BROSS,
Committee of Toronto Convention, held Sept 13th, 1858

GENTLEMEN—In compliance with your request, I visited Canada in the fall of 1855, and examined the proposed route of the Toronto and Georgian Bay Canal, in company with KIVAS TULLY, Esq., of Toronto, who had then just commenced its survey.

In the examinations made at that time, several routes presented apparent facilities for construction nearly equal, and in view of the great importance of the project, it was deemed essential to make a more extended survey of the country than was at first contemplated

Mr Tully has since devoted much time in a careful and thorough examination of four different routes, and the results he presents in his able report, published herewith

Mr Tully has so fully discussed all the points relative to the construction of the canal, that I beg to refer to his report for information on that head.

I propose to present in this report,

First—The distance by lake, canal and river, between Chicago and New York, and Chicago and Quebec, by each existing and contemplated route.

Second—Cost of transportation by each route, in vessels of different sizes

Third—Cost of the canal, tonnage and revenue, with the prospective increase from year to year.

Fourth—Extent of country tributary to the canal, climate, agriculture and mineral resources, extent of country now under cultivation, present population, railway progress, etc.

Fifth—Conclusion

1st. *The Distance by Lake, Canal and River*—The following table of distances has been made up from the most reliable information I could obtain by the examination of charts, and by consulting navigators now resident in Chicago. It will be found to vary from the table prepared by Mr Tully, or from estimates heretofore made. The variation is mainly between Chicago and Buffalo, which has heretofore been computed at 1,100 miles. This distance, no doubt, has been made up from the coasting distances, which has been the route taken generally by vessels heretofore.

But it is believed that a vessel starting from Chicago, and taking the most direct route through the lake, would not necessarily have to go more than 918 miles to reach Buffalo.

Wherever the St Lawrence river forms a portion of the route, it has been included under the head of lake, as being a navigation not materially more expensive than the lake.

The length of the canals on the routes to New York includes the distance to Albany, and is the actual length in all cases except by the Toronto and Georgian Bay route.

The whole distance in this case from Lake Huron to Lake Ontario, 100 miles, is called canal, whereas 23 miles of it is through Lake Simcoe, and from 15 to 20 miles is what might be termed slack water navigation, having a large extra width, really reducing the distance of actual canal to about 60 miles.

This explanation is due to the Toronto and Georgian Bay route, although in making up the cost of transportation it was deemed advisable to call the entire length a canal.

Comparative Distances of the existing and proposed Routes from Chicago to New York.

ROUTE.	Lake	Canal	River	Total.
Chicago via Buffalo to New York	918	364	146	1428
" " Welland Canal and Oswego to N York	1043	237	146	1426
" " Georgian Bay Canal and Oswego to New York	686	309	143	1138
" " Welland Canal and Lake Champlain to New York	1389	167	145	1681
" " Georgian Bay Canal and Lake Champlain to New York	1011	289	145	1286
" " Ottawa Canal and Lake Champlain to New York	896	315	145	1356

Comparative Distances of the existing and proposed Routes from Chicago to Quebec

ROUTE.	Lake.	Canal.	River	Total
Chicago via Welland Canal and St Lawrence to Quebec	1401	69		1470
" " Georgian Bay Canal and St Lawrence to Quebec	1043	141		1184
" " Ottawa Canal and St. Lawrence to Quebec.	878	200		1178

2d *Cost of Transportation.*—In making up these tables it has been assumed that there would be no transhipment at Buffalo and Oswego but that the Erie and Oswego Canals would be enlarged to the dimensions now proposed for the Erie Canal, and that on all the other routes such improvements would be made as to enable the same vessel loading at Chicago to deliver her cargo in New York or Quebec, and on the route where no transhipment occurs, the price by river is computed the same as by lake.

This difference in the cost of transportation in small and large vessels is only intended to be approximate, the actual result would no doubt be still more favorable for the large vessel

FROM CHICAGO TO NEW YORK

ROUTE	Lake in miles.	Canal in miles.	River in miles.	RATE IN MILLS PER MILE. Lake.	Canal.	River	Transhipment and part of do.	Total.
800 ton vessel, Buffalo & Erie Canal	916	364	145	3	8	3	10	$6 49
450 " " " " "	816	364	145	2½	8	5	10	6 38
800 " " " " "	816	364	145	1½	8	5	10	6 03
750 " " " " "	916	364	145	2½	8	3	10	6 30
1000 " " " " "	916	364	145	2	8	3	10	6 07
800 ton ves. Welland Canal & Oswego	1043	237	145	3	8	3	10	5 86
450 " " " "	1043	237	145	2½	8	3	10	5 80
800 " " " "	1043	237	145	2½	8	5	10	5 54
750 " " " "	1043	237	145	2½	8	3	10	5 06
1000 " " " "	1043	237	145	2	8	3	10	4 82
800 ton ves. Geo'n Bay Can. & Oswego	685	309	145	3	8	3	10	5 37
450 " " " "	686	309	145	2½	8	3	10	5 18
800 " " " "	685	309	145	2½	8	5	10	5 01
750 " " " "	685	309	145	2½	8	3	10	4 84
1000 " " " "	685	309	145	2	8	3	10	4 67

FROM CHICAGO TO NEW YORK.

ROUTE.	Lake in miles.	Canal in miles.	River in miles.	RATE IN MILLS PER MILE. Lake	Canal.	River	Total
600 ton vessels Welland Canal and Lake Champlain	1358	167	146	3	8	3	$5 89
450 " " "	1389	167	145	2½	8	2½	5 80
600 " " "	1389	167	145	2½	8	2½	5 16
750 " " "	1389	167	145	2½	8	2½	4 63
1000 " " "	1569	167	146	2	8	2	4 48
300 ton vessel Georgian Bay Canal and Lake Champlain	1011	239	145	3	8	3	$5 52
450 " " "	1011	239	145	2½	8	2½	5 03
600 " " "	1011	239	145	2½	8	2½	4 80
750 " " "	1011	239	145	2½	8	2½	4 52
1000 " " "	1011	239	146	2	8	2	4 22
300 ton vessels Ottawa Canal and Lake Champlain	893	315	145	3	8	3	$5 64
450 " " "	893	315	145	2½	8	2½	5 28
600 " " "	893	315	145	2½	8	2½	5 12
750 " " "	893	315	145	2½	8	2½	4 80
1000 " " "	893	315	146	2	8	2	4 60

CHICAGO TO QUEBEC

ROUTE.	Lake in miles.	Canal in miles.	River in miles.	RATE IN MILLS PER MILE. Lake	Canal.	River	Total
300 ton vessels by Welland Canal	1401	69		3	8		$4 73
450 " " "	1401	69		2½	8		4 40
600 " " "	1401	69		2½	8		4 06
750 " " "	1401	69		2½	8		3 70
1000 " " "	1401	69		2	8		3 35
300 ton vessels by Geo n Bay Canal	1046	141		3	8		4 26
450 " " "	1046	141		2½	8		4 00
600 " " "	1046	141		2½	8		3 74
750 " " "	1046	141		2½	8		3 48
1000 " " "	1046	141		2	8		3 22
300 ton vessels by Ottawa Canal	978	200		3	8		4 62
450 " " "	976	200		2½	8		4 38
600 " " "	978	200		2½	8		4 04
750 " " "	978	200		2½	8		3 80
1000 " " "	978	200		2	8		3 65

CHICAGO TO LIVERPOOL.

In 1000 Ton Vessels.

Chicago *via* Buffalo to New York	$5 57	
New York to Liverpool 2950 miles at 1½ mills	4 47	
		$10 04
Chicago *via* Welland Canal and Oswego to New York	$4 82	
To Liverpool	4 47	
		9 29
Chicago *via* Georgian Bay Canal and Oswego to New York	$4 67	
To Liverpool	4 47	
		9 14
Chicago *via* Welland Canal and Lake Champlain to New York	$4 48	
To Liverpool	4 47	
		8 95
Chicago *via* Georgian Bay Canal and Lake Champlain to New York,	$4 22	
To Liverpool	4 47	
		8 69
Chicago *via* Ottawa Canal to New York	$4 60	
To Liverpool	4 47	
		9 07
Chicago *via* Welland Canal to Quebec	$5 35	
To Liverpool, 2602 miles at 1½ mills	3 75	
		7 10
Chicago *via* Georgian Bay Canal to Quebec	$3 22	
To Liverpool	3 75	
		6 97
Chicago *via* Ottawa Canal to Quebec	$3 55	
To Liverpool	3 75	
		7 30

3*d*, *Cost of the Canal, Tonnage and Revenue* —Of all the routes surveyed by Mr. Tully, Route No 1, presents the most favorable features and is the one that is recommended. This route commences at the mouth of the Humbee river and passes through Lake Simcoe, terminating at the mouth of the Nottawasago river on Lake Huron. I entirely concur with Mr Tully in his views of these terminal points. By reference to the profile, it will be seen that the ascent from Lake Ontario to the summit is quite uniform and gradual, admitting of a series of combined locks as shown on the profile, or in some cases of single locks with sufficient space between them for passing vessels.

The combined plan gives larger reaches between the locks and has some advantages in that respect for towing vessels. But these advantages are more than counterbalanced by the delay that must necessarily occur by such an arrangement of locks unless they are double locks, particularly when the canal is worked up to near its full capacity.

Wherever it was practicable, therefore, I should advise the single lock, with sufficient space between for the convement passing of vessels, or, when combined, that they should be constructed with a view to adding a double lock at a future day. No work of a difficult character presents itself until we reach the summit level, there we encounter a cut of nearly 200 feet at the deepest point, averaging about 50 feet for nearly ten miles. This is probably a larger and more extensive cut than has ever before been encountered on any public work, but the examinations, so far as made, do not show any thing insurmountable in its execution. Such allowance has been made in the estimate for contingencies as seemed necessary from all the information that has been obtained. It would be desirable, however, as this is the only serious obstacle, to have a more thorough examination made at this point with a view to ascertain with more certainty the quality of material to be encountered in making the cut.

The navigation through Lake Simcoe is favorable, with a sufficient depth of water for safety.

The cut between Lake Simcoe and the Nottawasago river averages about 50 feet for several miles, but there is nothing that indicates anything unfavorable or very formidable. From its entrance into the Nottawasago Valley to the western terminal point it is exceedingly favorable, except a short cut near the lake. The most part of this distance would be a very considerable extra width of water surface, affording a fine navigation. The Nottawasago river for some four miles from its entrance into the lake runs nearly parallel with the lake and is from 300 to 600 feet wide, with an average depth from 10 to 12 feet water, and at a very small expense may be made a perfectly safe harbor for a very large number of vessels.

Mr Tully's estimate for the route described is	$22,170,750
Six per cent. interest on this sum would be per year	1,330,245
For repairs and maintainance of the canal, say $1000 per mile or per year	100 000
	$1,430 245

In order to pay 6 per cent. on its cost and maintain it, we require an income of $1,430,245, will the country tributary to it afford a business that will justify this expense for its accommodation? By refering to what has been done in times past we may draw conclusions for the future.

In Messrs Parkinson and Smith's report on the St Clair, Chatham and Rond Eau Ship Canal, they estimate the total tonnage passing St. Clair flats in 1855, between the ports of Chicago, Milwaukee, Toledo, Cleveland, Buffalo, Oswego, and Ogdensburg, at 2,385,516 tons. Taking into account the smaller ports on the lake it will be safe to call the tonnage in 1855, 2,500,000 I am confirmed in my opinion that this amount is not over estimated, by consulting the very able report of Col. J D. Graham, U S Army, on the commerce of the lakes, and various other authorities.

In the very valuable reports of John B Jarvis, Esq, on the Caughnawaga Canal, and of William J. McAlpine, Esq, in 1853, then State Engineers of New York, I find that Mr. Jarvis estimates that the tonnage from 1853 would be doubled in six years and quadrupled in fifteen years, and that the total movement to and from tide water in 1868, from and to points west of Buffalo would be 9,000,000 tons. Mr. McAlpine estimates the movement on the Erie Canal in 1852 at a little more than 3,000,000 tons, allowing the same rate of increase as estimated by Mr Jarvis would very soon work the canal up to its full capacity in its enlarged state.

Assuming then the tonnage that passed the St. Clair flats in 1855 to have been 2,500 000, and allowing one third of this amount for the business between the ports and Lake Erie and points north and west of the St. Clair flats, we have left 1,666,667 tons as the amount that would probably have passed through the Georgian Bay Canal had it been completed in 1855 I assume as the rate of increase 22 per cent. for every five years The reasons for this are particularly set forth in another part of this report. And assuming the tolls on the canal to be four mills per ton per mile, or forty cents per ton, we have the following result

Year	Total Tonnage.	The portion of Tonnage that would pass the Canal	Tolls
1855	2 500 000	1 666 667	
1857	2790 000	1 860 000	
1860	3 275.400	2,183 640	
1865	4 255 343	2 836 895	1 134 758
1870	5 450 692	3 633.794	1,453 517
1875	7 031 392	4 687 594	1 875 037
1880	9 070 495	6,047 996	2 365 198
1885	11 700 938	7 634 214	3 053 686
1890	15 094 210	9 848 136	3 939 254
1895	19 471,530	12,704 015	5 081 606

This canal, if commenced soon and prosecuted with the energy it should be, may be in successful operation in 1865. We commence then with a business nearly equal to six per cent. on its cost, with a certain prospect of a rapid increase.

The lumber trade I have not considered in my estimate of the tonnage. The letter marked "A," see Appendix, from H. R. A Boys Esq., of Barne, Canada, will give an idea of what may be expected from that source.

EXTENT OF COUNTRY TRIBUTARY TO THE CANAL.

In this, as in other portions of this report, the reader is requested to place before him any good map of North America. It will be seen that the great central valley of the continent, lying between the Alleghany and the Rocky Mountains, stretches from the Gulf of Mexico to the Arctic Ocean. This magnificent valley—for there is no chain of mountains east and west to divide it—is drained to the south by the Mississippi, to the east, by the St. Lawrence to the Atlantic, and by the Seven, Nelson's, and other rivers, into Hudson's Bay, and to the north by Mackenzie's river, which empties into the Arctic Ocean. The great controlling streams of commerce have always followed the lines of longitude, and it needs no argument to show that the trade of the central portions of this vast valley—the largest and the richest upon the globe—must flow east and west through the lakes and the valley of the St. Lawrence. The north and south traffic upon the Mississippi and its tributaries will ever be large and important, but, as compared with the commerce upon the lakes, and eastward, through the Erie canal and the St. Lawrence, to the ocean, the trade upon the Mississippi must ever fall far below, both in bulk and value, that upon the lakes and the St. Lawrence.

It will be conceded at once that the Georgian Bay Canal will be a competitor for the trade with the seaboard of all the country east of the Rocky Mountains, and west and north west of the southern point of Lake Michigan. By the Illinois Central Railroad wheat is brought from the southern counties of that state to the Chicago Market, and it will be certainly safe to say that the

lake route will attract the trade as far south as the latitude of Alton. Drawing a line, therefore, east and west through Alton, and extending it to the Rocky Mountains, we shall have within the bounds of the United States, east of the Rocky Mountains and west of Lake Michigan, 700,000 square miles, territory enough to form fourteen states as large as Ohio. There is much more territory than this, but it is intended only to embrace that which is valuable and available for settlement and profitable cultivation. The report of H. U. Hind, Esq., Naturalist and Geologist of the recent Canadian expedition to the Red River of the North, gives the amount of territory available and valuable for settlement, north of the boundary of the United States, and drained by the rivers flowing into Lake Winipeg, at 400,000 square miles. It is safe to say, therefore, that the commerce of 1,100,000 square miles of the great central valley of the American continent, would be tributary to the Georgian Bay Canal. It has been stated by men whose judgment is worthy of respect at 2,000,000 of square miles; but we prefer to be far within rather than beyond the true estimate. This vast territory is equal to one third of the entire area of the United States, and, Russia excepted, is nearly equal to that of all Europe combined.

COMMERCIAL FACILITIES.

To illustrate this topic by particulars would require a much larger space than the limits of this report will permit. The magnificent chain of lakes extending west far away towards the center of the continent, and affording nearly all the advantages of ocean navigation, is a most wonderful provision of Providence to promote the commercial, and hence the social, welfare of the millions who are soon to inhabit this valley. So gentle are its slopes that the large rivers which drain it into the Gulf of Mexico and Hudson's Bay, the Mississippi and its tributaries, and the rivers flowing into and draining Lake Winipeg, are navigable for steamers for thousands of miles. No country in the world presents a finer field for railway enterprise, and as it fills up with a vigorous, industrious, intelligent population, these advantages will be fully appreciated and improved.

CLIMATE.

The climate of that portion of the territory in the United States that would be tributary to the Georgian Bay Canal, belongs to the most healthy and inviting portions of the temperate zone It is the range which, in all ages of the past, has nourished the most populous and powerful empires, and that such is the "manifest destiny" of the country under consideration all who have studied its character and resources have entire confidence Of the 400,000 miles of territory in the valleys of the Red River of the North, the Assiniboin the Saskatchewan, and surrounding Lake Winnipeg, recent investigations have shown that its climate is well adapted to promote the health and the vigorous development of the human family Mr Hind, whose report is referred to above, says that "all the necessaries of life are found in the Red river valley All crops cultivated in Canada succeed well, and often show an average yield far in excess of Canadian returns The climate of the agricultural season is well adapted to all the operations of husbandry Corresponding observations show that the summer temperature is three or four degrees warmer than at Toronto" The winter climate, he adds, "is very severe." Though severe, all experience has proved that the winter is bracing, and not unfavorable to the ordinary out-door operations of this season in northern latitudes The recent large and elaborate work of Prof Blodgett on climatology has proved that the climatic lines, when they pass west of Lake Superior, bend far away to the north, and this eminent climatologist gives it as his well matured opinion that the climate of the region under consideration is highly favorable to the development of a great, prosperous and powerful people

AGRICULTURAL RESOURCES

In agricultural resources it is conceded by all who understand the subject that no portion of the globe, of equal extent, contains so rich a soil, or so many elements of all that can contribute to

the physical comfort and the social elevation of man. All the cereals are produced in great abundance, fruits of all kinds common in corresponding latitudes are matured in the greatest perfection, and horses, mules, cattle, sheep, swine, poultry, and all the domestic animals, are produced in the greatest abundance. If fully developed, there can be no question whatever that the soil of this vast region would support a population as dense as that of any other portion of the globe, and afford the means for the highest physical, intellectual and social development. Should we speak by particulars, and give figures and estimates, from well-known facts, as to its productive capacity, they would appear more like the extravagant musings of a vagrant imagination than the deductions of sober matter of fact reality.

MINERAL RESOURCES

COPPER. — Both in extent and richness the copper mines of Lake Superior are without a rival. The actual figures shewing the size of masses of native copper found in the Minnesota, the Cliff, and some of the other mines appear absolutely fabulous. There are hundreds of square miles on the south shore of Lake Superior whose strata are filled with copper, and an abundance of this metal is found there to supply the world for ages to come.

IRON. — The reputation of the Lake Superior iron as among the very best in the world is now generally established. Mountains of this essential element of civilization exist there, sufficient alone to supply the entire continent for an indefinite period in the future. It is also found in Illinois, Wisconsin, Iowa and Minnesota, in some districts in great abundance. Facts are not wanting to prove its existence in that part of the British possessions under consideration, and in some portions it is believed that it will be found in large quantities.

COAL. — Illinois contains one of the largest and ere long it must become one of the most productive coal fields in the world. It also extends into Iowa and exists there in large quantities. In relation to the northern portion of the territory under consideration in the United States, and that which is embraced in the

British possessions, the following facts are quoted from an able and most valuable lecture on "The Undeveloped Northern Portion of the American Continent," delivered before Ball's Commercial College, Chicago, February, 1856, by JOHN L. SCRIPPS, Esq., editor of the CHICAGO DAILY PRESS. The lecturer (page 17) says:

"I remark in the next place upon the existence of coal in a large portion of the country. Frumahere and Gov. Simpson speak of its outcropping at different places on the Saskatchewan. Lewis and Clark saw bituminous coal between Fort Clark and the falls of the Missouri River. Umbartson also saw coal in the same localities. Wyeth saw large quantities of it on the Yallowstone. Gov. Stevens' party found the whole country from the falls of the Missouri westward to the mountains, nearly five hundred miles underlaid with lignite. Bonneville speaks of regions among the mountains near the head waters of the Yallowstone, which abound in anthracite coal. In fact coal has been traced along the 47th parallel of latitude for a distance of nearly ten degrees of longitude, with a southern outcrop, rendering it more than probable, when considered in connection with the discoveries of coal in the Saskatchewan, the Athabasca, Mackenzie's River and Great Bear Lake that a coal field of greater extent than any other in the world exists in the western half of the district of country included in our subject. Further evidence is found to support this hypothesis in the discoveries of coal nearly all around the northern rim of the North American continent by the captains of whaling vessels and by the hardy explorers who have tempted the Arctic seas in search of a north west passage, by the presence of both coal and lignite in Greenland, upon Disco Island and upon the Faroe Islands, off the coast of Greenland—thus indicating the wonderful economy of nature, or rather the existence of a beneficent Providential design, by which regions destitute of timber are supplied with an easily accessible fuel."

LEAD.—The extent and the resources of the Galena lead district are already very generally known. As in the magnitude of her lakes and rivers, so in the bestowment of her mineral treasures in this vast country, Nature has distributed with a most bountiful hand. There is here enough and to spare of this valuable mineral, for all the people that can ever find a home upon the American continent.

In summing up the mineral resources of the northern portion of the American continent, Mr. Scripps, in his lecture above quoted, says:

"The most extensive systems of salt springs and lakes abound in this region, in different localities, both within the American and the British Possessions and in some districts the mineral itself is found in great purity and abundance.

"Considering the vast amount of minerals already discovered with scarcely any scientific exploration, the hypothesis is by no means so unreasonable one, that no portion of the continent exceeds this vast undeveloped north west in mineral resources."

EXTENT OF TERRITORY NOW UNDER CULTIVATION.

It is impossible to estimate with any certain approach to accuracy, the amount of this vast region that is now actually under cultivation. The rapidity of the growth of the North-west has so far exceeded all former ratios of increase that one scarcely dares to believe the figures when the census returns show the acknowledged results from one decade to another. In 1850 the amount of land in that portion of the United States now under consideration which was then under cultivation, as shown by the census returns, was as follows:

Illinois,	3,039 546
Wisconsin,	1 045 499
Iowa,	824 632
Minnesota,	9 035
Total,	5,914,702

This is an area of 10,804 square miles, only about one fifth of the area of the State of Illinois. Since 1850 we have no returns to show the amount of land brought under cultivation, but the statistics of population, as will hereafter appear, show an increase of 65 per cent. in five years, from 1850 to 1855, in the states above named; and the increase for the same period in these states, and Indiana, Ohio and Michigan, show a gain of 29 per cent. With the ratio of 29 per cent., there would be 8,020,041 acres under cultivation in 1855, and at the close of 1857, 8,954,765 acres, equal to 15,554 square miles.

PRESENT POPULATION,

And its probable increase, and also that of the lands brought under cultivation, Commerce, etc.

The population of the district in the United States, now under consideration, in 1850, '55, '57, as derived from the government and state census, and other sources, was about as follows:

	1850.	1855	1857
Illinois,	851,475	1 300,250	1,500,000
Wisconsin,	305 331	551 105	650 000
Iowa,	192 215	348 985	590 000
Minnesota,	6,077	40 000	200 000
Nebraska,		4,000	30 000
	1 356,182	2,241,344	3,070,000

These figures, as above stated, show an increase from 1850 to 1855, of some 65 per cent ; but if the States of Ohio, Indiana and Michigan be added to the above, as they are commonly included in speaking of the North west, the ratio is brought down to 29 per cent. which we prefer to take as a basis for future calculations. Taking these figures as the ratio for thirty-seven years, which is a fraction more than the average lifetime of a generation, we present the following table, showing the probable increase of population, and the amount of lands to be brought under cultivation for every five years, from 1855 to 1895.

From the very able and valuable report of Col J. D. Graham, U. S. Army, on the commerce of the lake ports for 1855, we find that the total value of the commerce of Chicago and Milwaukee which passed over the St. Clair Flats for that year, was $136,304,602 72. Adding only the value of the commerce of Milwaukee for that of all the other ports on lake Michigan, we shall have $159,105,130 55 as the total value of the commerce from lake Michigan which passed over the St. Clair Flats in 1855

POPULATION, COMMERCE, TONNAGE, ETC.

The following Table shows the Present Population, amount of Land now under Cultivation, Commerce of Lake Michigan which would be tributary to the Georgian Bay Canal, or for which it would be a competitor, Estimated Revenue, with the Tonnage and Cost of Freight, on Vessels which passed over the St. Clair Flats in 1855, with their Probable Increase for thirty-seven years, at the rate of 29 per cent. for every five years—29 per cent being the Ratio of the Increase from 1850 to 1855, of the Population of the States commonly included in the term North West, viz— Ohio, Indiana, Illinois, Michigan, Wisconsin Iowa, and Minnesota.

	1855.	1860.	1865.	1870.	1875.	1880.	1885.	1890.	1895.
Population	9,397,564	3,973,009	5,064,193	4,643,989	5,997 719	7,737 062	9,988 737	12,876 926	16 622,044	21,425,699
Total number of acres of land under actual cultivation,	8,920,681	9,564 765	11 961,594	15,076,686	19,448,158	25,088,135	32 369,861	41,749,148	53,856 404	69,474,750
Total of lands cultivated in square miles,	13 937	15,384	18,690	23,550	30,387	39,200	50,568	65,236	84,150	108,554
Amount of land remaining at each period to be cultivated in square miles	1,366,183	1,364 448	1 361 746	1,356,444	1,349,613	1,340,800	1,329,482	1,314,767	1,295,850	1271,446
Value of the commerce of Lake Michigan passing over St. Clair Flats,	$180,106 131	177,586,790	208,468,237	238,913,385	246,732,907	447,998,859	577,979,089	744,690 731	960,661,660	1238,289,283
Tonnage passing St Clair Flats in 1855 with its prospective increase,	2,500,000	2 795,000	3 215 400	4 325,340	5,450 692	7,061,229	9,070,486	11 700,925	15,084,192	19,471,507
Estimated amount of Tonnage that would pass through the canal,	1,666,667	1 869,000	2 169,840	2,816,893	3,636,794	4,537 594	5,917 991	7,634,213	9 845,136	12 704,985
Estimated revenue for the canal				1 126 756	1,454,717	1 815,037	2,367 196	3,050,485	3,938,054	5,081,994

Let us discuss the facts contained in this table for a few moments, and first, as to population. It may be said that the ration of twenty nine per cent. will not be continued through thirty seven years. As above stated, the ratio of the increase of population in the territory west of Lake Michigan, for the last five years, has been sixty five per cent.—more than twice the figures from which our results are derived.

Take another fact. The census returns show that the entire North west, embracing Ohio, Indiana, Illinois, Wisconsin, with the addition, now, of Iowa, Minnesota and Nebraska, in 1820, contained 792,718 inhabitants, in 1857—the same period on which our results are based—they contained, in round numbers, 7,200,000 people, an increase in a little more than the average life time of one generation of EIGHT HUNDRED PER CENT. With railways and telegraphs, and magnificent steamers on lake and river, and withal, the knowledge of the agricultural and mineral wealth of this vast country, the beauty and magnitude of its prairies, and the salubrity of its climate, now matters of daily conversation and newspaper comment in every portion of the civilized world, who shall say that the increase of population in this broad, favored land will not equal, in the next thirty seven years, the results of the same period in the past. Leaving out Ohio, Michigan and Indiana, that ratio would give, west of Lake Michigan, in 1895, within the territory of the United States, north of the latitude of Alton and east of the Rocky Mountains, a population of 24,560,000. This result is truly amazing, but it is not more wonderful than what a large proportion of those now living, both in the United States and in Canada, have themselves seen and realized. Take still another illustration. The old northern States proper have increased in the last thirty seven years in the ratio of eighty five per cent. It has been proved from the statistics of our railways for the past few years, and other sources, that about 250,000 people have annually emigrated into the country west of Lake Michigan. Apply the ratio of the increase of population of the old States to those already in the territory under consideration, and half the ratio for half the time, to this stream of human energy that is constantly flowing into it, and we still have, in 1895, a population of 19,787,000. It is therefore deemed a moderate estimate to say that the portion of territory in the United States that is tributary to the Georgian Bay Canal will contain, only thirty seven years hence, a population of at least TWENTY MILLIONS OF SOULS.

The question next in order is, what will be the population of the territory under consideration that is within the British possessions? There are no facts within our reach to show what the present population of the valley of the Red River of the North, and at the trading posts of the Hudson's Bay Company, is; but several thousands, it is believed, are already there. Any calculations, however, based upon their probable increase, would fall far within the mark. For scores of years the Hudson Bay Company have kept the world in ignorance as to the extent and the richness of the country lying north and west of Lake Superior, using all the means in their power to strengthen the conviction that it was a cold, inhospitable region, fit only for the residence of Indians and trappers, and the wild animals whose furs were the only productions of this vast territory that could be made available for civilized man. The gigantic monopoly of this company is now, or soon will be, broken; the ignorance which it so industriously fostered, is now dissipated, and the people of Canada and Great Britain will assert their right to emigrate to and settle in this vast, rich, and inviting region. An immense stream of active, intelligent and enterprising men will, ere the next decade shall have passed away, be pouring into it from Canada, England, Ireland and Scotland, and by the year 1895, the foundations of a great and prosperous empire will be laid there, numbering even then, at a moderate estimate, from one to two millions of people. It may be asked in general, and it is certainly a pertinent question, where all these people to settle that portion of the United States and the British possessions are to come from? We answer: They will be the intelligent, the enterprising, and the vigorous sons and daughters of Canada and the older states of the American Union. Immense navies will be put in commission to transport to this favored land the same class of emigrants from England, Ireland, Scotland, France, Holland, Germany, and nearly all the other kingdoms and empires of Europe. Where land is cheap, the soil rich and productive, the climate inviting, and withal, the government free and stable, and life and property secure, there will the intelligent millions of our race congregate for the next half century.

Let us canvass next the amount of land likely to be brought under cultivation. It may have been noticed in this, as in regard to population, that the whole of Illinois is included in our calculations, but about half the state of Missouri lies north of the latitude of Alton, and having no means to divide either state, if the

southern section of the one be taken for the northern section of the other, the results will be sufficiently accurate for all practical purposes. The amount of territory likely to be under cultivation in the different periods, as stated in the table, is far too low. It is much too small now. The population of the territory under consideration increased, from 1850 to 1855, in the ratio of sixty five per cent., instead of twenty nine, the element used in the preparation of the table. There can scarcely be a doubt that there was twice as much land under cultivation in 1857 in Illinois, Wisconsin, Iowa and Minnesota, as there was in 1850. We shall be disappointed if the census returns of 1860 do not show an increase of three hundred per cent. since 1850. At that time there were 6,914,761 acres under actual cultivation, as shown by the United States census. An increase of three hundred per cent. would give, in 1860, 20,744,283 acres, or 32,413 square miles, and not 18,260 as shown in the table.

We must wait for the result of the census of 1860, to learn the actual amount of land which the hardy sons of the west shall have brought under cultivation, but the figures which exhibit the commerce of the lakes, as shown by Col. Graham's report above referred to, and the statistics of the commerce of Chicago for the past few years as proved by the able and carefully prepared statistical articles of the Chicago DAILY PRESS, afford one of the most important subjects of study to be found in the annals of modern commercial progress. Thirty years ago the commerce of Lake Michigan was merely nominal, confined to an occasional visit of a small government vessel with supplies to the forts in the adjoining territories. In 1855, its value, as deduced from Col. Graham's report, was $139,109,131. To be more particular, we present the following table, showing the receipts and shipments of grain at the port of Chicago for the last four years:

TOTAL RECEIPTS.

	1854.	1855.	1856.	1857.
Wheat bush.	3,038,968	7,635,097	8,767,780	10,854,781
Corn	7,490,773	6,832,377	11,998,908	7,409,130
Oats	4,134,383	2,947,183	2,819,867	1,707,946
Rye	43,691	68,068	47,707	87,911
Barley	201,764	201,865	128,467	127,689
Total	15,011,548	19,324,643	23,050,218	19,866,756
Flour into wheat	792,876	1,203,510	1,624,605	1,968,670
Total	15,804,423	20,487,853	24,674,824	21,878,406

TOTAL SHIPMENTS.

	1854.	1855	1856.	1857
Wheat, bush.	2,206,725	6 288 155	6 327 420	6,485,056
Corn	6,327,890	7,517,625	11,12 688	6,814,816
Oats	3,228 987	1 899 538	1 614,545	416,778
Rye	41 157	19,318	859	———
Barley	146,421	93,082	19,081	17,993
Total	12 364 185	16,816,718	20 001 973	13,734 435
Flour into Wheat	568 185	817 095	1 081 945	1 203,240
Total	12,602 620	16,633,816	21 583 921	18,933,678

The following table of the receipts of lumber, shows the steady and wonderful growth of that trade for the last eleven years:

	Lumber ft	Shingles.	Lath.
1847	82 118 625	12,148,500	5,865,700
1848	69 009 250	20,009 000	12,092 109
1849	75 259 553	39 057 760	14 58 738
1850	100,084 779	55,422 750	18 305 700
1851	125 058,467	60,338,250	27 583,476
1852	147 816 282	77 080 800	19 769 670
1853	202,101 098	92 452 784	69 138,116
1854	228 856,783	98,081 250	32 481,550
1855	206 553 467	118 770,860	45 467,570
1856	258,643 169	135,876,000	79 236,120
1857	453,895,198	181 852,250	80 190,000

The following table shows the number of arrivals at the port of Chicago in 1857, with the tonnage and number of men:

Number and Tonnage of vessels arrived at the Port of Chicago for the Season of 1857

	Steam	Propr.	Sail.	Total	Tonnage.	Men
March		3	13	16	3 266	124
April	30	28	248	306	16 813	4 795
May	50	56	800	906	208,500	8,560
June	49	82	900	1 041	218 108	9,032
July	41	96	926	1 069	228,700	8,899
August	46	98	917	1 089	278 105	10,136
September	42	104	785	882	227,786	8,737
October	24	91	589	714	203,672	7,237
November	12	41	268	322	74 485	3,225
December	2	8	36	44	11 209	464
Total	306	616	5,433	6 387	1,460 616	61,458
Arrivals unreported, (estimated)				1 200	292,800	7 200
Total				7,587	1 753,416	68 658
Total in 1856				7 328	1 546 376	65 592
Total in 1855				5,310	1 008,846	
Total in 1854				5,021	1 052 644	

There were laid up in winter quarters at this port, 1857–8, 7 steamers, 29 propellers and 214 sail vessels.

POPULATION OF CHICAGO

We present the following table showing the population of Chicago at different periods:

1640	4,470	1860	28,263
1842	7 580	1862	38,733
1845	12 088	1865	60,652
1846	14,169	1854	65 872
1847	16,859	1855	83 509
1848	20,026	1856	110 000
1849	23,047	1857	130,000

RAILWAY PROGRESS.

In January 1852, there was but one railway, the Galena, forty miles long, entering Chicago. The list of roads whose business tends to swell the commerce of that city, now actually completed and in operation, is as follows:

	Miles.
Chicago and Milwaukee	85
Kenosha and Rockford	11
Racine and Mississippi	26
Chicago, St Paul and Fond de Lac	121
Milwaukee and Mississippi (Western Division)	130
Galena and Chicago Union	121
Fox River Valley	34
Wisconsin Central	8
Beloit Branch	20
Beloit and Madison	17
Mineral Point	32
Dubuque and Pacific	23
Galena (Dillon) Air Line	123
Chicago, Iowa and Nebraska	36
Chicago, Burlington and Quincy	210
Burlington and Missouri	35
Quincy and Chicago	100
Hannibal and St. Joseph	62
Chicago and Rock Island	182
Missouri and Missouri, 1st Division	56
" " 2d "	20
" " 3d "	12
Peoria and Bureau Valley	47
Peoria and Oquawka	143
St. Louis, Alton and Chicago	284
Illinois Central	704
Pittsburgh, Fort Wayne and Chicago	333
Michigan Southern and Northern Indiana	242
Cincinnati, Paru and Chicago	28
Michigan Central	282
New Albany and Salem	284
Eleven trunk and twenty branch and extension lines	3 353

The total earnings of all these roads for 1856, were $17,343,242 89, in 1857 they were $18,590,520 26 Only six years previous, the earnings of the forty miles in operation, were a mere nominal sum. The State of Illinois alone has now 2,775 miles of completed railway; six years ago it had but 60 Comment upon the above tables and figures, for which we are indebted to the valuable yearly statistical articles of the Chicago DAILY PRESS, is entirely unnecessary; they show more clearly than language possibly can, the rapid progress of the North West in wealth, population and the means of commercial and social intercourse Let it be observed that the commerce with the seaboard of all the country bordering upon the railways centering in Chicago, with the exception of the three eastern lines, the Michigan Central, the Michigan Southern and the Pittsburgh roads, would be tributary to the Georgian Bay Canal But this is not all By the time the canal can be completed, thousands of miles more of railway, extending in every direction through this vast, fertile region, will be pouring the wealth of millions of enterprising, energetic freemen into the navies of Lake Michigan, and the great majority of that commerce will flow through this magnificent highway, for the trade of the continent and the St Lawrence to the ocean An empire will by that time have grown up north and west of Lake Superior, which will contribute its traffic to swell the receipts and reward the enterprise of those who shall build this canal

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CONCLUSION

By reference to the preceding tables it will be seen that the Georgian Bay route is nearly three hundred miles shorter than any other except the Ottawa route, that it is 50 cents per ton cheaper than *via* Buffalo, and 15 cents per ton cheaper than *via* Welland Canal and Oswego That by the Lake Champlain route, the Georgian Bay route is 29 cents per ton cheaper than *via* Welland Canal, and 38 cents per ton cheaper than *via* the Ottawa route

That to Quebec the Georgian Bay route is 13 cents per ton cheaper than *via* Welland Canal, and 33 cents per ton cheaper than *via* the Ottawa route

In point of time the Georgian Bay route would save about one day over any other In comparing the Georgian Bay route *via* Oswego, Champlain and Montreal, we find that the route *via*

Champlain is 45 cents per ton cheaper than via Oswego, and to Quebec is $1 45 per ton cheaper than via Oswego, and $1.00 per ton cheaper than via Champlain. There can hardly be a doubt but what this margin is sufficient to secure at least a fair proportion of the immense trade of the west through the St Lawrence, and I can see no good reason why it should not secure much the largest share of it.

On the Ottawa route, not having very reliable information about it, but knowing that over 400 miles of it would be close navigation, I have assumed 200 of it to be canal, or equal to a canal in expense of navigation. Several objections present themselves to this route:

1st. The route being so much farther north there would be a loss of from two to four weeks time each year in the navigation.

2d It enters the St. Lawrence at a point where the trade must necessarily go down the St. Lawrence instead of having a choice of routes, unless the Caughnawaga Canal is built, and in that event it would not have the choice *via* Oswego

3d The trade would be more divided between that route and Buffalo than it would be between the Georgian Bay route and Buffalo, for much that passes through the Georgian Bay route would be intercepted at Oswego and pass through more than 200 miles of the New York canals

4th The entire business would be lost to the St Lawrence canals, and the direct benefit to Canada would be far less than by the construction of the Georgian Bay canal

The Georgian Bay route has the advantage of good navigation to and from it, avoiding St Clair flats and the dangerous navigation of Lake Erie, and at a moderate expense may have safe and commodious harbors at each end of it. There would be a saving of nearly 300 miles in distance, a saving in expense of transportation, and of time and insurance. It enters Lake Ontario at a point where if the Caughnawaga Canal is built, trade has a choice of three routes to tide water, and the entire business from two of them would pass through the St. Lawrence canals. It will be seen by Mr. Tully's report that the supply of water is abundant, not only for the canal but for extensive water power, and that all the materials required in its construction are convenient.

It has been assumed in the comparison of the routes that the St. Clair flats would be improved so as to admit the passage of 1000 ton vessels. How difficult this would be I am unable to say, but I am credibly informed that the expenditures at that point hereto-

fore has not produced any beneficial effects in the improvement of navigation. It is probable, therefore, that in the event of this route being improved, that there would be more liability of interruption and detention than by the Georgian Bay route.

When we take into view the vast extent of country whose business must seek an outlet through this channel, the conviction is irresistible that the wants and necessities of the west will not be met until the Georgian Bay and Caughnawaga Canals are constructed, the Oswego and Champlain canals enlarged—the first equal to the Erie canal and the last for the passage of 1000 ton vessels, and the St. Lawrence improved for the passage of the same sized vessels.

When this is done a direct trade will be opened between Chicago and all parts of the world To doubt this would be to doubt the intelligence and energy of the business men of Chicago, Milwaukee and the Lake Michigan cities.

They have already in fact, commenced the trade, and nothing is required for its successful prosecution but an improvement of the navigation, so as to admit of a large class of vessels

Let us examine for a moment the cost of these improvements

Georgian Bay Canal	$22,170,750
Caughnawaga Canal	4,267 890
Champlain Canal, Estimated	5,000 000
Improvement of the Hudson say	2,000 000
St Lawrence Canal, Estimated	7 000,000
Total	$40,438,640

But suppose they cost $50,000,000, where, I would ask, among the hundreds of millions of dollars that have been spent in public improvements could you select the expenditure of $50,000,000, the benefits of which are so widely diffused and promising such vast results in the future as would the completion of these improvements under consideration?

Let the cities of Canada awake to their true interest, let them unite heartily in this enterprise, and great as it confessedly is, it can certainly, I might add easily, be accomplished. It would secure beyond a peradventure, for the cities of the St Lawrence, Toronto, Montreal and Quebec, a leading and a commanding position upon the American continent

In this connection I quote the language of Wm. Bross, Esq., editor of the Chicago DAILY PRESS, who, from the commencement

of this important enterprise, has devoted much time and energy to bring it before the public, used in a speech before the convention at Toronto, Sept. 13th, 1855:

"I once heard Capt Higgins, a veteran sailor of our city who commenced his eventful career on Lake Ontario, in 1812, after referring to the growth and endless prospective value of the products of the west, say, 'That the great God when he made the mighty west, made also the lakes and the mighty St. Lawrence to float their commerce to the ocean;' and I might add, as well attempt to lead the boiling current of Niagara to the sea in hose pipe as to ship the products of these 700,000 square miles to the ocean by the Erie and the Welland Canals and all the railways now or hereafter to be constructed."

The same gentleman, in an article in the PRESS, after showing the immense benefits which the Georgian Bay Canal would confer upon Toronto, closes with the following paragraph in relation to Montreal, applicable, with nearly equal force, to Quebec:

"For the purpose of direct trade with Europe, it matters little whether vessels (from the lakes) go directly through, or whether cargoes are transhipped at Montreal. In our judgment, certainly during the summer, transhipment there into very large ocean vessels and steamers would be found the most profitable. In the winter propellors and sail vessels, especially if they rated at one thousand tons, might find it more profitable to escape from the embargo of ice upon the lakes, and spend the winter in the American or European coasting trade. But in any event, Montreal would hold the key to all the immense trade of the west, flowing down the St Lawrence to the ocean. Her merchants would furnish assorted cargoes of goods for the west from all parts of the globe, from which full cargoes could not be made up to the lake cities. In any event, she would be to the trade of the St Lawrence what New York is to that of the Hudson. It needs but the enterprise on the part of her citizens corresponding to the magnitude of the interests at stake to secure for her this proud position beyond any contingency. It is true that national pride and immense capital and the best track of commerce, are on the side of New York, but God and nature are stronger than all these, and let any intelligent man compare the 'Erie ditch' with the mighty St. Lawrence, with a canal to pass vessels of 1,000 tons burthen from Georgian Bay to Toronto, and he cannot doubt for a moment on which side the immutable laws of commerce will decide the contest."

I am much indebted to the valuable reports of Col J D Graham, U S Army, John B Jervis, and William J McAlpine, Esqrs, and to William Bross, Esq, editor of the Chicago DAILY PRESS, and others, for much important statistical information.

Very respectfully submitted,

R. B. MASON, *Consulting Engineer*

REPORT,

BY KIVAS TULLY, ESQ.

CHIEF ENGINEER'S OFFICE,
Toronto, January 16th, 1858.

SIR—On the 14th of September, 1855, the Committee appointed by the convention of delegates from Chicago, Oswego, Toronto and Barrie, instructed me "to complete the survey of a route for the canal from Toronto *via* Lake Simcoe to the Georgian Bay on Lake Huron, and to report to this Committee, with a topographical description of the country, levels, heights, sections, and approximate estimates for the construction of a canal capable of passing vessels of one thousand tons burthen; a profile of the line to be furnished with the report."

The Committee also arranged that the members of the Chicago delegation should secure the services of one of the most eminent engineers, to go over the ground with Mr Tully, and act with him as consulting engineer in the progress of the survey.

In accordance with the tenor of the above resolutions, I herewith submit my report on the several proposed routes to which I consider my duties to have been confined, leaving to the consulting engineer, Col. R. B Mason, of Chicago, the important task of furnishing the necessary statistical information in reference to the extent of the anticipated trade that may be relied on as the means of defraying the cost of construction.

In my preliminary report to you as President of the Board of Trade, containing a statement of the field operations of the various routes, dated the 22d of January, 1857, it is mentioned that between the 16th and 23d of November, 1856, I accompanied Col. Mason, the consulting engineer, when he made an examination of the route, and at a conference with the Committee held afterward, a further survey of the route between Lake Couchiching, at the north eastern extremity of Lake Simcoe and Match

adash Bay, was recommended by him as essentially necessary, also approximate profiles of a route through Albion, and from the Holland river to the Nottawasaga river, which was afterward formally sanctioned and ordered by the Committee. In conformity with these suggestions and directions, I have also to submit the required information in reference to those routes, with the plans and profiles of the same, without which information the report could not be said to have been satisfactorily completed.

I have the honor to remain, sir,

Your obedient servant,

KIVAS TULLY

THOMAS CLARKSON, Esq.,

Chairman of the Committee, and President of the Board of Trade, Toronto.

REPORT

The peculiar outline of the western portion of the Province of Canada, with respect to the northern boundary line of the United States, has often been subject to comment by several public writers. The short distance between the Georgian Bay and Lake Ontario in the vicinity of Toronto across the western peninsula, compared with the circuitous route by Lakes Erie and Huron, has long attracted the attention of those who have taken an interest in the progress of this section of the province, and suggested this route as a probable means of water communication with the north west

From the earliest period of the history of this province, the route from Toronto by Lake Simcoe to the Georgian Bay on Lake Huron has been known and used as a portage by the Indians and traders to the north west, in preference to the routes by the Ottawa river or Lake Erie. The rapid increase, during the last ten years, of the population, and, consequent agricultural and commercial progress of the States of the American Union, lying immediately west of Lake Michigan, and the serious losses to life, property and shipping on the St. Clair Flats and Lake Erie, also, the limited facilities afforded by the Erie canal for the transport of merchandise to and from those western states, have directed the serious attention of merchants and shipowners in the United States and Canada to the construction of the Toronto and Georgian Bay Ship Canal, as an additional avenue for facilitating the internal commercial transport between the west and the seaboard.

It is now nearly twelve years since this route was first explored by me, at the request of Dr. Rees of this city [see appendix to report] but the probable cost of the proposed communication, compared with the prospective trade, prevented any serious discussion on the subject. In fact it was considered altogether chimerical at that time, and beyond the mere exploration, the question was not entertained.

The cost of the extensive excavation that would have to be made through the ridge of land lying between Lakes Simcoe and Ontario, so as to permit the use of the waters of Lake Simcoe as a feeder to the proposed canal, was considered, at that time, to be beyond the demands of the western trade; but the unparalleled rapidity with which this trade has increased during the last ten years, and its undoubted future augmentation, has forced the question prominently on the attention of the mercantile community, and the demand for an additional avenue is now seriously made.

In a letter addressed by me to John B. Robinson, Esq., M. P. P. for this city, a copy of which accompanies this report, I have endeavored to point out the failure of the Welland Canal in diverting the western trade to the River St. Lawrence, as the cheapest route between the north west portion of this continent and Europe, the consequent demand for the construction of an additional avenue at a more northerly point than Lake Erie, and the superior advantages of this route over all others in reference to distance and anticipated economical working.

I now feel satisfied, from tangible evidence, that the statements there made will be fully borne out and established in this report, and also in that of the Consulting Engineer, Col. R. B. Mason, which is now in course of preparation.

The delay that has occurred in the completion of the survey was unavoidable. I was unwilling that any but reliable information should be presented to the public, as, in the absence of reliable data, the future success of the undertaking might be seriously impeded, and the construction of the canal delayed. In order to present the requisite information in as distinct and satisfactory a manner as possible, the report has been framed under the following heads:

1st. Terminal Harbor accommodation. 2d. Water supply to the canal. 3d. Cost of construction. 4th. Comparison of the routes. 5th. General comparison with other routes. 6th. Collateral advantages. 7th. Conclusion.

L.— TERMINAL HARBOR ACCOMMODATION

At the convention held in this city on the 13th of September, 1855, to consider the question of the construction of the Georgian Bay Canal, it was unanimously

Resolved, That the immense trade from the North west demands the immediate construction of a canal between the Upper Lakes and Lake Ontario of sufficient capacity to pass vessels of 1000 tons burthen from Lake Huron to Lake Ontario at Toronto or its vicinity

In accordance with the instructions of the committee, Toronto Harbor was made the starting point from Lake Ontario The survey was commenced immediately west of the old Fort, and the ground between this point and Lambton on the River Humber was accurately measured and leveled From the Grand Trunk Railway Bridge, where it crosses the River Don, a line was also leveled along the banks of the river and a branch of the Don which crosses Yonge street, immediately north of the city, continuing along the base of the Davenport hill until it joined the western line. The intention of surveying and leveling those lines was to ascertain the approximate elevation of the ground above the level of the Humber River, and otherwise determine the feasibility of constructing both those branches, not only as termini, but also as an available water power, the future advantage of which would be incalculable to the prosperity of this city for manufacturing and ordinary mechanical purposes

I regret to state that without the expenditure of a much larger amount than will be required to construct the proposed canal by another terminal line, this desirable result cannot be obtained The principal difficulties to be overcome are the incapacity of the entrance to the harbor of Toronto to permit the passage of vessels of 1000 tons and drawing 12 feet of water, and the necessity of constructing a high dam across the Humber and an aqueduct across the Black Creek at a point about two miles above Weston

At the lowest water level of Lake Ontario, which must be taken as the datum as far as regards a terminal harbor, there would be only eleven feet of water in the channel at the entrance, and the bottom being rock, could not be deepened, except at considerable expense. As the proposed terminus of the canal would have been to the west of Toronto, in moderate weather only vessels could enter or leave the canal without entering Toronto Harbor, but this is a contingency that should not be risked

The terminal harbor accommodation for shipping should be safe, easy of access under ordinary circumstances, and commodious. In no respect could this be attained at the proposed terminus west of the Queen's Wharf without the expenditure of a much larger amount than would be necessary if a harbor was constructed elsewhere. The only feasible line by which Toronto Harbor could be made the terminus would be to the east by the valley of the river Don, where the requisite depth of water could be procured at a reasonable cost. This line would require the construction of an eastern entrance at Ashbridge's Bay. To construct a suitable terminal entrance for the proposed Ship Canal, at this place, would require a much larger amount than would be necessary at the mouth of the Humber River for a harbor of a superior character.

Even during the highest water level on Lake Ontario, which would give 16 feet of water on the present entrance to the Toronto harbor, the passage of a vessel of 1000 tons, and drawing 13 feet of water, during a south westerly gale, would be attended with great risk.

For these reasons I have come to the conclusion that the necessary terminal accommodation cannot be afforded at the harbor of Toronto within a reasonable cost. The explorations and surveys of the several routes demonstrate that the valley of the River Humber is the most direct and practicable line that can be adopted for the southern portion of the canal. The cost of constructing the canal from Weston to the mouth of the River Humber will not be greater than would be necessary under the most favorable circumstances, and would be of an ordinary character, whereas, if the terminus was at Toronto, the apparent cost of the intermediate construction would be much greater, so much so that I have not considered it necessary to encumber the Report with a comparison of the estimates. In addition to the above, the Eastern line, with a terminus at Ashbridge's Bay, would be six miles longer; and the Western line, with a terminus at the Queen's Wharf, two miles longer than the Humber line. Under these circumstances, therefore, I consider the Humber line offers the greatest advantages, and, in recommending this line, the Humber Bay would be assumed as the southern terminal entrance of the canal. By the construction of two piers of crib work, 2,000 feet in length and 40 feet in width, 200 feet apart, and extending into 20 feet of water, with a depth of not less than 13 feet, at low water, inside the piers, a terminal harbor, safe, easy

of access, and commodious, can be obtained at the Humber Bay This bay is protected from the effects of north-westerly, also easterly storms, which are the most violent on Lake Ontario, by the Peninsula, south of Toronto, about 4 miles distant, but there is little or no protection from south westerly storms, which prevail during the autumn, unless when close to the entrance, which is sheltered by a projecting headland to the west. The distance to the opposite shore of the Lake being only 30 miles, the force of the wave would not be such as to materially endanger the safety of a large vessel running between piers 200 feet apart, and in 20 feet of water, whilst smaller vessels of 500 tons can run into Toronto harbor in safety, during unusually severe gales from this quarter. During the period of low water, the Humber Bay, with the proposed piers, would be the only available terminal harbor for vessels of the capacity for which the canal is proposed to be constructed

Within the line of shore, after passing between the piers, the marsh is proposed to be excavated to the extent of eight acres, so as to afford sufficient accommodation for the anticipated traffic, and is capable of being enlarged, if required.

For the terminal harbor accommodation on Lake Huron two points have been surveyed—one at the mouth of the Nottawasaga River, and the other at Matchedash or Gloucester Bay The selection of either of these harbors will, in a great measure, be determined by the choice of routes, but, as respects the amount to be expended on each, the Nottawasaga River requires a less outlay By the construction of piers, of the same character as those recommended for the Humber Bay, also 200 feet in length, a harbor similar in many respects may be obtained. The mouth of the Nottawasaga River would be exposed to the north west gales of the Georgian Bay, which are sometimes very violent in the spring and autumn, and would have a range of 100 miles to Cabot's Head

This would no doubt be a serious difficulty in a nautical point of view, but the risk would not be so hazardous if ordinary caution is used. Supposing a vessel to be running for the entrance of the canal, at the mouth of the Nottawasaga River, the vessel would pass close to the Christian Islands, under the lee of which shelter could be procured until the severity of the storm had passed, when the entrance of the harbor, 20 miles distant, could be reached in safety.

This course would not be necessary during ordinary gales, but only in case of unusually severe storms. With this exception, Nottawasaga Bay offers every facility for a suitable terminal harbor, the approach being marked with bold headlands, and with deep water one mile from the shore.

For the better explanation of the capabilities of this river and the Humber as terminal harbors, I have prepared detailed charts of the same, which are herewith submitted. By reference to the chart of the Nottawasaga River, which has been drawn from actual survey, it will be noticed that the river extends in a south-westerly direction parallel to the line of the shore for a distance of nearly 3 miles, with a width varying from 220 feet to 550 feet, and an average depth of 10 feet, containing available harbor accommodation of over 150 acres, at a moderate outlay for deepening and improvement, the cost of which is stated in the general estimate.

Gloucester Bay, through which a vessel would pass to Matchedash Bay, being what is termed land locked, would, in the case of sailing vessels, be objectionable on account of its being too much sheltered; but this would not affect steam propellers.

In order to render Matchedash Bay available as a terminal harbor, it would be necessary to dredge a channel one hundred feet wide through the center, for nearly four miles, and also to remove a large quantity of granite boulders. This latter work would be attended with a considerable and unavoidable expense, the approximate cost of which is given in the general estimate.

On this account, I consider this bay inferior to the Nottawasaga river, as a terminal harbor, and am therefore strongly in favor of the latter.

I am aware that strong objections have been urged successfully against the practicability of forming and maintaining a harbor at the mouth of the Nottawasaga river. I cannot agree with such opinions, and would here mention that on my first inspection of this harbor, in company with Col. Mason, the consulting engineer, more than two years since, I did not hesitate to express my belief that a safe and commodious harbor could be constructed at this point, superior to many of the harbors on the lakes, with which Col. Mason agreed, and I am satisfied he has not since changed his opinion. In fact, we were both fully convinced that an industrious and populous city would sooner or later spring up on the banks of the river and the narrow peninsular which divides it from the bay.

II. — WATER SUPPLY TO THE CANAL.

The proposed dimensions of the locks are 265 feet in length, 55 feet in width, 12 feet lift, and 12 feet on the sill.

Two locks of these dimensions would require 350,000 cubic feet of water, nearly, for each vessel passing through the canal. If 500 vessels passed through during the day, 17,500,000 cubic feet would be required, or about 12,000 cubic feet per minute. According to two experiments on the quantity of water flowing from Lake Simcoe into Lake Couchiching, at the narrows, the quantity of water at this point amounted to over 100,000 cubic feet per minute, making due allowance for the friction at the bottom and sides.

The average rain fall of the water shed of Lake Simcoe (1,200 square miles), according to a statement procured from the Meteorological Observatory, at Toronto [*See Appendix C*], and extending over a period of seventeen years, gives 36.94 inches; and allowing for evaporation absorption and vegetation, say 24.94 inches, we have twelve inches available rain fall per square foot for the year. This would give 90,000,000 per day, or 60,000 per minute. The available supply would be greater than this, judging by the experiments at the narrows, which give over 100,000 cubic feet per minute. According to experiments in the county of Hertford, in England, the evaporative effect was as 15 to 27, nearly, or a little above 50 per cent., leaving 33¼ per cent. additional to be consumed by vegetation. What the exact amount of loss from this cause is, cannot be ascertained, but the sum of both would hardly exceed two-thirds of the whole rain fall, which would be five times as much as would be required to pass fifty vessels, of 1,000 tons each, per day, as this would be the greatest number of vessels that could be passed through the canal conveniently in fifteen hours, allowing a little over fifteen minutes for each vessel to pass through the locks. There will still be a large available water power, which, along the entire line of the canal, after passing the summit level, will form a source of considerable future profit, by renting the same for mills and manufactories.

Immediately after passing the summit, an additional water power would be also available from the water sheds of the Humber and Nottawasaga rivers, amounting to 30,000 cubic feet per minute, and 52,000 cubic feet per minute respectively along the line of the canal, based on the same calculations of an average

of twelve inches per superficial foot per annum Further evidence is hardly necessary, and from the above sources there will not only be a sufficient supply of water to feed the canal, but a large remaining available water power, in fact, an inexhaustible supply for the wants of a much more numerous population than can be anticipated at present.

In order to store up the rain fall of the Lake Simcoe water shed, it will be necessary to construct one waste weir and three close dams at the branches of the river Severn, at the north eastern extremity of lake Couchiching, the cost of which is stated in the general estimate

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III — COST OF CONSTRUCTION

This question also embraces the practicability of the construction of the several proposed routes.

The route, as originally agreed on, commenced at "Toronto or its vicinity," passed along the valley of the Humber, in a northerly direction, through the township of Kings, to the Holland river and Cook's Bay, on Lake Simcoe; from thence to Kempenfeldt Bay, on the western shore of Lake Simcoe The starting point from Kempenfeldt Bay was from the mouth of a creek about one mile from Barrie, at the extremity of the bay, thence in a westerly direction to the Nottawasaga river, about one mile north of the Ontario, Simcoe and Huron railway line, and following the valley of the river to the Nottawasaga Bay, the most southerly portion of the Georgian Bay, Lake Huron.

ROUTE NO ONE

The terminal harbor accommodation having been already considered, it is only necessary to describe the extent and character of the works to be executed between the termini

Along the valley of the Humber there are no engineering difficulties of an extraordinary character as far as the 23d section, at the town line of Vaughan and King, where the deep excavation through the ridges commences. This excavation extends to the 33d section, or ten miles The greatest depth to be excavated will be 167 76

feet, or 2 24 under 200 feet. This will be the greatest depth from the summit. The ridges present a gradual inclination north and south; the slope to the north being 5½ miles in length, and the southern slope 4½ miles, total length 10 miles. The depth of the excavation will average 30 feet, and will contain nearly 48,000,000 cubic yards, and being composed, as far as can be conjectured, of light clay and gravel, will not cost more than 25 cents per yard, making a total of $12,000,000 From the 33d section to the 48th, to Cook's Bay, at Lake Simcoe, the canal would pass through the Holland River marsh, following the course of the Holland River, except at the bends of the river, which are cut off A considerable portion of this river is of an available capacity, and would require slight alterations, averaging 150 feet in width, with a depth of water from 8 to 12 feet.

From the 48th to the 71st section, at the western extremity of Kempenfeldt Bay, it will be lake navigation where there are no difficulties to be encountered, Lake Simcoe being of sufficient capacity to admit vessels of a large tonnage navigating it without any risk At the 48th and 71st sections piers of timber crib work of a suitable character have to be constructed

From section No 1 to No. 6 there will be a deep excavation averaging 50 feet, the greatest depth at section No 2 being 78 feet, and containing a little over 6,000,000 cubic yards at twenty-five cents per cubic yard, the total cost of which would be $1,500,000 — the material to be excavated being of the same quality as described in the deep excavation in the ridges as far as can be judged from geological data, and other indications. [*See Appendix D.*]

At section No 8, the character of the work comprises a chain of combination locks six in number From this section to No 25, there are no engineering difficulties, as the canal will follow the course of the Nottawasaga River, which, with slight improvements, can be rendered of sufficient capacity to answer the required purposes This portion, 18 miles in length, being liable to heavy floods in the Spring and Autumn, will require a much higher tow-path than usual, which will slightly increase the average cost per mile Between the 25th and the 27th sections, it will be necessary to cut a channel through the sand ridge which forms the south eastern bank of the Nottawasaga Harbor, in order to save a distance of six miles a waste weir being constructed across the river to maintain the water at the required level.

The total quantity contained in this excavation will be over 2,000,000 cubic yards, the greatest depth being 100 feet, and the average depth 50 feet, the cost of this excavation would be $500,000

From the 27th to the 29th section the work would consist of dredging the bed of the river of an average depth of two feet. The 29th section reaches the Nottawasaga Bay, where a harbor is to be constructed as before described

The lockage on route No 1 will consist of two single locks, eight double locks, three treble locks, and three quadruple combination locks, being thirty-nine locks in number from Lake Ontario to Lake Simcoe, having an average lift of a little over 12 feet, and the total lockage of 470 feet.

From Kempenfeldt Bay to Lake Huron there will be five single locks, and six combination locks, or altogether eleven locks, with an average lift of a little under 12 feet, or 130 feet in all—making the total lockage of route No 1 to be 600 feet.

In nearly every instance where combination locks have been provided, it was a matter of necessity from the nature of the surface Though objectionable in many respects, it is of advantage in consequence of increasing the length of the levels, which on this route will vary from 1 to 16 miles, not including the long summit level of Lake Simcoe of 56 miles. The total length of this route will be 100 statute miles.

The canal, if constructed by this route, would cross the Great Western and Grand Trunk Railways, and the Ontario, Simcoe and Huron Railway twice At each of these points as indicated on the map, a railway swing bridge must be constructed. Accommodation swing bridges of an ordinary character will have to be constructed at several points along the route For crossing the deep excavation it is proposed to have four accommodation bridges 20 feet above the level of the water, with inclined approaches of 1 in 20, each bridge to be two miles apart for the entire length.

ROUTE NO TWO,

Comprises the first portion of route No. 1, between Lakes Ontario and Simcoe

The continuation of this line extends from the terminus on Lake Simcoe to Dr Robinson's creek, on the north west shore of Lake

Conchiching, at the north-eastern extremity of Lake Simcoe, about midway between the "Narrows and the River Severn." The distance from Lake Ontario to this point being eighty one miles, from section 48 to 81, comprises Lake Simcoe, the only difficult portion of the navigation being at the Narrows, which consists of a circuitous and hazardous channel. The Board of Public Works of the Province has ordered the necessary improvements, which have been in course of execution during the past year, rendering any additional expenditure unnecessary, except the contingency of deepening the channel still more, as the present improvement only contemplated accommodation for steam vessels drawing eight or nine feet of water.

From Dr. Robinson's creek to Matchedash Bay the canal would be fourteen miles in length.

Between sections Nos. 1 and 4, a deep excavation will be necessary, principally through limestone rock, containing over 5,500,000 cubic yards, at a cost of the same amount in dollars, the cost of excavation being estimated at $1 per cubic yard. The greatest depth would be 138 feet, and the average depth 75 feet. From section No. 4 to No. 8, the construction is of an ordinary character, between Nos. 8 and 9 an excavation, also through limestone rock, occurs, containing 500,000 cubic yards, and at section No. 13 an excavation through granite, containing 300,000 cubic yards, at a cost of at least $3 per cubic yard. Between sections 14 and 17 (Matchedash Bay) a channel will have to be excavated 100 feet in width, and a trackway in crib work constructed; the quantity of excavation, a large portion of which would be through granite, would be nearly 1,000,000 cubic yards, the cost of which would be $3,250,000, including the cost of the trackway and harbor accommodation.

The lockage on route No. 2, consists of six single locks, one double, and one treble combination lock—11 locks altogether, the lift being the same as for Route No. 1, between Lake Simcoe and Lake Huron, and the total lockage 600 feet.

The total distance by this route, denominated No. 2, combining a portion of No. 1, would be 98 miles, comprising 63 miles of summit level, including Lake Simcoe, and levels ranging in length from one quarter of a mile to 30 miles.

The cost of bridging on route No. 2, not including the combined portion of No. 1, would be trifling, as the country through which the canal would pass, is unsettled, excepting portions at the termini

A trackway of timber crib work, 20 feet in width, and three miles in length, must be constructed on the east side of the channel, to be excavated through Matchedash Bay, also harbor accommodation at the entrance on Gloucester Bay.

ROUTE NO THREE

Comprises a portion of No 1, as far as the 14th section, from which point it branches off to the west, through the valley of the north-west branch of the Humber and the township of Albion, and the valley of the Nottawasaga River, in Tecumseth and Essa, where it again joins route No 1, at section No 10, and continues along this line to the terminal harbor, at the mouth of the Nottawasaga River.

The deepest excavation on this route occurs between sections Nos 13 and 28, containing 114,000,000 cubic yards, which would cost $28,500 000, and the greatest depth to 246 feet, an amount which places this route, beyond all comparison, the most expensive

It was considered necessary to arrive at some approximate estimate of the cost of this route, as several persons living in the township of Albion were under the impression that this was the most direct and cheapest route for the canal.

The cost of the necessary excavation, as stated above, will, as a matter of course, completely remove this impression In addition to this cost, a feeder from Lake Simcoe would require to be constructed The lockage would be the same as No 1, and the length would be 23 miles.

ROUTE NO FOUR,

Comprises the principal portion of No 1, as far as section No. 35, where it branches off from the Holland River through North Gwillimbury and Tecumseth toward the Nottawassaga River, where it joins route No 3, at section 32

This was one of the routes approved and recommended by Col. Mason to the committee in 1855, and will be found to possess many superior advantages in comparison with other routes.

This route, like No. 3, does not enter Lake Simcoe, though it is proposed to be connected with it by a navigable feeder adapted

for a smaller class of vessels The greatest amount of excavation on this route occurs between sections Nos 2 and 8, containing 3,000,000 cubic yards, which would cost 2,000,000, the greatest depth being 123 feet, and the average depth 64 feet.

From section 32 of route No. 3, to section No 10 of route No 1, where No 3 joins, there are no constructive difficulties, as the fall in the valley of the Nottawasaga river is comparatively trifling for the whole of this distance (eighteen miles) The line then continues along route No 1 to the terminal harbor at the mouth of the Nottawasaga river The lockage on this route will be the same as No. 1 (600 feet), and the distance 84 miles Several accommodation bridges will be required on this route

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ESTIMATE OF COST

Subjoined are the estimates of the cost of the proposed routes, route No. 1 being the least, and route No. 3 the greatest, the difference between Nos. 1 and 2 being trifling

The cost of the harbor accommommodation of No 2, is the largest, and Nos. 3 and 4 the least. It will also be observed, that in the construction of route No. 3 a much larger amount of excavation would be required than in the other routes, and next in order Nos 4 and 2 The size of the locks has been determined by the dimensions of the propeller "Iowa" of 1,000 tons, namely, 242 feet long, 31½ feet wide, and drawing 11½ feet of water when loaded, making allowance for the necessary space for opening and closing the gates, locks 265 feet in length, 55 feet in width and 12 feet on the sill, are considered sufficient for the purpose Two schooners of 400 tons each can also pass through locks of these dimensions at the same time.

The canal is intended to be 115 feet wide at the water line, and 13 feet in depth, except in the deep excavation, where the width at the water line is proposed to be 100 feet, and through the rock cutting on route No 2, 90 feet at the water level and 100 feet above the level of the towpath

The greatest width of the deep excavation through the ridges in King, would be 680 feet at the surface level

ESTIMATE OF ROUTE No. 1.

QUANTITY	DESCRIPTION OF WORK.	RATE.	DOLLS.
63,200,000 c yds	Earth excavation	25c	$15 825,000
	50 locks complete	$80 000	4,000 000
	4 dams	5,000	20 000
	23 waste weirs	4 000	100 000
	2 harbor accommodations	200 000	400 000
	2 harbor Lake Simcoe	100 000	200 000
	50 accommodation bridges	5 000	250 000
	15 culverts	8,000	120 000
	Land damages		200 000
			$21,115 000
	Engineering and contingencies		1 055 780
			$22 170,780

ESTIMATE OF ROUTE No. 2

QUANTITY.	DESCRIPTION OF WORK.	RATE.	DOLLS.
54 000,000 c. yds.	Earth excavation	25c	$13 500 000
6 000 000 "	Rock excavation, limestone	$1 00	6,000 000
700 000 "	Rock excavation, granite	3 00	2,100 000
	Locks		4 000 000
	Dams		20 000
	Waste weirs		100 000
	Harbor accommodation		600 000
	" Lake Simcoe		200 000
	Bridges		200 000
	Culverts		100 000
	Land damages		200 000
			$27 020,000
	Engineering and contingencies		1 351,000
			$28 371 000

ESTIMATE OF ROUTE No. 3.

QUANTITY	DESCRIPTION OF WORK	RATE.	DOLLS.
135 000,000 c. y ds	Earth excavation including feeder	25c	$33,750 000
	Locks		4,000 000
	Dams		20 000
	Waste Weirs		100 000
	Harbor accommodations		400 000
	Bridges		250 000
	Culverts		120 000
	Land damages		200 000
			$38 840 000
	Engineering and contingencies		2,192 000
			$41,032 000

ESTIMATE OF ROUTE No 4.

QUANTITY	DESCRIPTION OF WORK	RATE	DOLLS.
70,000,000 c y ds	Earth excavation	25c	$17,500,000
	Locks		4,000,000
	Dams		20,000
	Waste Weirs		100,000
	Harbor accommodation		400,000
	Bridges		250,000
	Culverts		120,000
	Land damages		200,000
			$22,590,000
	Engineering and contingencies		1,129,500
			$23,719,500

COMPARISON OF THE ROUTES.

With respect to the terminal harbor accommodation, routes Nos 1, 3 and 4 are on an equality, and would, in my opinion, be superior to No 2, the terminal harbor of which would be at Matchedash Bay. Beside the difficulty of constructing a channel through Matchedash Bay, there would be a great risk to vessels drifting aground, not only on the west side of the channel, during easterly winds, but also in Gloucester Bay On the east side there are several large granite boulders, to remove which, and construct a trackway on the west side of the channel, through Matchedash Bay, would add nearly $1,000,000 more to the estimate. As a harbor of refuge, the west side of Gloucester Bay would be superior in every respect, and would afford the most ample accommodation for all classes of vessels during the season of navigation. For sailing vessels it is rather too much sheltered, but for propellors it would be accessible at all times

In the early portion of the spring, and late in the autumn, its sheltered waters would also be frozen at least one week sooner, the entrance to the harbor being nearly half a degree further north than the proposed terminal harbor at the Nottawasaga River For general traffic I would, therefore, recommend the other routes in preference to No 2, for terminal harbor accommodation The comparative cost of the route is as follows—

No 1	$22,170 750
No 2	22 536 000
No. 3	41,032 000
No. 4	23 719 500

The details are stated in the estimate. With regard to cost, No. 1 route is most favorable. The difference between Nos. 1, 2 and 4 cannot be considered sufficient to give one route a very great advantage over the other in this respect; but the cost of route No. 3, being double, precludes any further argument in its favor. The comparison, therefore, between Nos. 1, 2 and 4 will be narrowed to the question of facilities of construction and economical working. The heavy amount of rock excavation encountered in route No. 2 appears objectionable on account of the increased price, but the quantity being much less on account of the side slopes being decreased, the difference of cost will not be so great as stated in the estimate.

The limestone to be excavated being of a quality that could be used in the construction of the locks on this section of the route, if not on others, would diminish the cost of this excavation. As this is in a great measure, a matter of conjecture, no deduction has been made in the estimate on this account, particularly as it is probable that the stone required for building the locks on the remaining sections would be procured from other localities.

The question of terminal harbor accommodation and cost having been decided, that of economical working has next to be considered. The lockage being the same on all the routes, the length of the routes and time occupied in passing through the canal, will determine the superiority. The respective lengths and time will be as follows:

ROUTE	LENGTH IN MILES				TIME IN HOURS		
	Lake Simcoe.	Summit.	Other levels.	Total.	Canals.	Locks.	Total.
Route No. 1	23	53	44	100	27	14	53
Route No. 2	32	30	55	92	23	16	49
Route No. 3		22	30	83	23	16	54
Route No. 4		28	56	84	38	16	54

In the above calculations, the rate of speed on Lake Simcoe is calculated at six miles per hour, on the summit three miles, and two miles on the other levels. Nearly twenty minutes is allowed for passing each lock.

The comparison in time would be in favor of route No. 2. The terminal harbor accommodation, being in favor of Nos. 1 and 4, will give them a greater advantage, according to my judgment.

The comparison, therefore, will rest between these two latter routes. In point of time, then, the difference is of no consideration; the principal and final objection to route No 1 would be the probable delay to sailing vessels passing through Lake Simcoe in consequence of adverse winds, to which No 4 would not be subject.

Would this inconvenience or consequent expense, be at all in proportion to the difference between the cost of the routes, namely, $1,500,000? I think not; and I am the more inclined to this decision from the certainty that the majority of the vessels passing through the canal would be propellers, which would not be affected by adverse winds, at least, it would not prevent their continuing their passage through Lake Simcoe, or, in fact, from either terminus, except during very severe storms.

Under all the circumstances of comparison, the route as originally proposed, appears to be the best, and I am not aware that any further local examination would alter this decision, as, in every instance, I am satisfied that the most favorable locality was selected. In any comparison, therefore, with other, or existing, or proposed avenues for the western trade, the route from the river Humber, west of Toronto, to Lake Simcoe, and from thence to Lake Huron, by the Nottawassago river, will only be considered

The estimated cost being	$22 170,750
The length	100 miles.
And the time	33 hours.

V — GENERAL COMPARISON WITH OTHER ROUTES.

The existing water communications between Lakes Superior, Michigan and Huron, and the Atlantic Ocean, are as follows:

No. 1 — By Lake Erie, Buffalo and Erie Canal.
No. 2 — " " Welland Canal, and Oswego and Erie Canal
No. 3 — " " " " and the St. Lawrence

The projected water communications, as ship canals, are:

No. 1 — By Lake Erie, Welland Canal and St. Lawrence.
No. 2 — By Georgian Bay, Toronto and St. Lawrence.
No. 3 — By " " Ottawa River and St. Lawrence.

To which may be added the proposed ship canal between the St Lawrence, Lake Champlain, and the river Hudson, and from Oswego to the river Hudson Nos. 1 and 2 of the existing routes have New York as their sea port, and No. 3 Montreal and Quebec.

For the projected routes, New York, Montreal and Quebec would be the sea ports, in case the projected ship canals between Montreal and Oswego and the Hudson river were constructed, and the St. Lawrence canal enlarged.

Chicago being the center of internal commerce at present, will, in every comparison, be made the starting point, and *vice versa*.

This city must be selected as the starting point from the west, for obvious reasons The rapid growth of Chicago in all those elements which constitute a great commercial and enterprising city, indicating, as it does, a prosperity and progress unparalleled in the commercial history of the world, justifies the well earned title of the "Center of Western Commerce"

The cities of Milwaukee and Superior, also Waukegan, Kenosha, Sheboygan and Green Bay, are proportionably interested in the construction of this additional avenue for their trade, and will no doubt unite with Chicago and Canada in ensuring its accomplishment.

A division of interests in advocating the construction of other channels for western trade, until this is completed, would be fatal to the success not only of this project, but of all others which are designed to facilitate the transit of western commerce

Comparative Distances and Estimated Time of the Existing and Proposed Routes

FROM CHICAGO TO NEW YORK.

No.	ROUTE.	DISTANCE IN MILES.			Lockage height in feet	TIME IN HOURS				REMARKS.
		River and Lake	Canal	Total.		River and Lakes	Canal	Lockage	Total	
1	Buffalo Erie canal and Hudson river	1 251	364	1 615	668	175	121	17	234	The distance from Chicago to Buffalo is taken at 1,100 miles, and from Chicago to the Georgian Bay at 600 miles See report on Ottawa route W Shanly, C E
2	Welland Oswego canal and the Hudson river	1 401	287	1 688	1 040	175	79	26	280	
3	Welland, Champlain canal and the Hudson river	1 682	154	1 846	535	210	35	16	281	
4	Georgian Bay Toronto, Oswego and the Hudson river	824	286	1,210	1 810	115	96	33	244	
5	Georgian Bay Toronto, St. Lawrence and the Hudson river	1,205	213	1 418	905	150	71	23	244	
6	Georgian Bay Ottawa and the Hudson river	1 078	300	1,378	824	135	100	23	258	

FROM CHICAGO TO QUEBEC.

1	Welland and St. Lawrence river	1 393	71	1 564	535	199	24	13	286	For comparison of distances. See Board of Works (Canada) Report, 1857
2	Georgian Bay, Toronto and St. Lawrence	1,116	120	1 236	805	140	40	20	200	
3	Georgian Bay Ottawa and St. Lawrence	873	213	1 185	681	122	70	17	209	

N B.—In the above tables for steam propellers, eight miles an hour is allowed for the rate of speed on the river and lakes, three miles an hour on the canal, and one and a half minutes for every foot of lockage.

New York to Liverpool, 2,980 miles; Quebec to Liverpool, 2,502 miles; difference in favor of Quebec, 478 miles.

By the above table of comparative distances, it will be perceived that the Toronto and Georgian Bay Canal would not only be the shortest of existing or proposed routes in distance, with one exception, but allowing for the increased lockage, would also be the shortest in point of time, whether New York or Quebec is the seaport. By a comparison with the shortest of existing routes to New York, namely, Buffalo, Erie canal and Hudson river, the Toronto, Georgian Bay and Oswego route would be 405 miles and about four days shorter in point of time, allowing fifteen working hours for each day during the season of navigation.

Also, by comparing the Welland and St. Lawrence to Quebec, with the Toronto, Georgian Bay and St. Lawrence, the latter would have an advantage of 428 miles in distance and save over three days. In the above calculations the detention in passing the St. Clair Flats are not taken into consideration, which, according to the argument in favor of the construction of the Rondeau and Chatham Ship canal, averaged six days for each trip, or three days either way. The average annual losses to shipping at this point alone, irrespective of detention, has been calculated at $1,000,000, which would be so much saved and in favor of the Toronto and Georgian Bay route. On this basis a comparison may be formed between the above and any of the other routes, and in every instance it will be found to be still more favorable.

The difference, also, from Chicago to Liverpool by the Georgian Bay, Toronto and Quebec, is 452 miles less than by Toronto, Oswego and New York, and 857 miles than by the present route by Buffalo, Erie canal and Hudson river.

If it is admitted that the time has now arrived when Ship Canals must be constructed to connect the great lakes with the Atlantic Ocean, then the Toronto and Georgian Bay route possesses still further advantages over all others existing or projected. The expense and difficulty of deepening St. Clair Flats from 9½ to 12 feet, and, it may be added, impracticability, except at a considerable expense, would be an effectual barrier which could only be removed by the construction of the Rondeau and Chatham Ship Canal, at this point, at an estimated cost of $6,000,000. The proposed lateral cut to the Welland Canal has also been estimated at $4,000,000. There we have a proposed expenditure of

$10,000,000 of Canadian capital, which, if expended in the construction of the Toronto and Georgian Bay Ship Canal, would leave but $12,000,000 to complete a work which would save 428 miles by the Quebec route, including the hazardous navigation on Lake Erie, which is admitted to be the most disastrous compared with all the other lakes.

The tendency of the construction of the Reedeau and Chatham Ship Canal, the most feasible and economical method by which the navigation of this portion of the St. Lawrence can be improved, would be to facilitate the existing trade to and from Buffalo and the Erie Canal, the proportion of the increase of trade to the Welland Canal and St. Lawrence could hardly be expected to be at all commensurate with the cost of the undertaking as far as this Province would be concerned.

Since 1847, "when the rivalry for the carrying trade of the great west was fairly begun between Canada and the State of New York," the expected trade by the St. Lawrence has been gradually diminishing in comparison with the Erie Canal. During the approaching season the enlarged Erie Canal will offer increased facilities for western traffic, and the trade of the St. Lawrence will be still further reduced. It has been truly remarked that "all the canals, railways, and other means of communication that can be made across the Canadian peninsula for the next twenty years, will not afford sufficient accommodation for the gigantic increase of the commerce of the great West." Admitting the truth of the above remark, it would be inconsistent to oppose any of the projected improvements either by Buffalo or Montreal, but the superior claim that this route has on Canadians should be first considered, and our energies directed to its early completion. If its construction will restore the trade to the St. Lawrence that has been lost, then we ought firmly to protest against Canadian influence and capital being expended on rival projects.

With respect to the capacity of the proposed Toronto and Georgian Bay Canal, in comparison with those of existing routes, it will be conceded at once to be superior in every respect.

The passage of 50 vessels per day of 1000 tons each, or 10,000,000 tons in 200 days, which is the estimated yearly period of navigation, would meet the requirements of the trade for some years to come, while the present traffic, about 6,000,000 tons, is quite as much as the Erie Canal can conveniently accommodate,

and the annual increase will continually demand further enlargement until at length a ship canal of the proposed dimensions in this locality will be required.

Instead of this questionable method of occasional enlargement, the most expensive that can be adopted, would it not be more advisable to construct additional avenues, thereby creating increased facilities for internal transports? This, under all circumstances, would appear the reasonable conclusion, and which, it is to be hoped, will yet be arrived at by all parties interested.

VI.—COLLATERAL ADVANTAGES.

The direct advantages that will follow the construction of the Toronto and Georgian Bay Ship Canal in opening a shorter and more expeditious route between Lakes Superior, Michigan and Huron and the Atlantic Ocean, has been argued in the foregoing general comparison of routes.

The collateral advantages may be considered as being of a strictly local character, though their connection with the main project will become more evident as an auxiliary, when the work has been completed.

According to the calculations of the available water supply, it has been computed at 80,000 cubic feet per minute; this supply from the summit to the north and south would be augmented by the rain fall of the water sheds of the Humber and Nottawasaga rivers, which is computed at 82,000 cubic feet per minute, making a total of 202,000 cubic feet per minute, or 90,000 cubic feet for the southern or Humber portion, and 112,000 for the northern or Nottawassaga water shed.

These quantities multiplied by the height, 130 feet for the northern, and 470 feet for the southern, would give the available water power of each, an unfailing source of considerable profit, being in the vicinity of a populous city, and of incalculable value for manufacturing and mechanical purposes.

CONCLUSION.

In order to convey a clear idea of the position and advantages of the proposed canal, lithographed plans and profiles are now in

course of preparation, having been reduced from the original plans and profiles which accompany this report.

The first map will represent the united counties of York and Peel, and the county of Simcoe, on which the proposed routes are indicated. The second plan will contain reduced profiles of the routes, and the position and number of the locks.

The last will be a prospective map, shewing the general position of the proposed ship canal to connect Lakes Huron and Ontario at Toronto, in reference to Chicago, New York and Quebec, with the existing and proposed routes and comparative distances before mentioned.

As soon as Col. R. B. Mason's report is completed, it is proposed to have it printed, together with this report, appendix, and plans attached, so as to present the whole in a complete form, and convey the requisite information in as concise a manner as possible, consistent with the importance of the project.

The advantage of having a correct representation of the topography of the country lying between the city and Lake Huron, with the lines of the water sheds of Lake Simcoe, and the Humber and Nottawasaga rivers, will be evident on the inspection of the plans, and has influenced the committee in incurring this additional outlay, which they feel certain will be reimbursed.

The estimated cost of this undertaking will at first appear considerable, but on consideration of the immense advantages that will result from its construction, in comparison with the other public works not yet completed in this Province and the United States, will on serious reflection justify the expenditure of a much larger amount than may have been anticipated when the project was first contemplated.

The cost of the Grand Trunk Railway when complete, including that superior engineering work, the Victoria Bridge at Montreal, has been estimated at $48,000,000, more than double the estimate cost of the canal. This railway, extending from Portland to Stratford, a distance of 714 miles, the remaining portion between Stafford and Sarnia, 79 miles, is expected to be completed this year in connection with a railway across the peninsula of Michigan, thereby forming another link between the Atlantic and Great West. The cost of this railway has ceased to be considered a serious matter in comparison to the anticipated advantages; it is now an established fact, the voice of the Legislature having stamped it a national undertaking, and as such deserving the active and zealous

support of the Province generally, to which it has already been indirectly of incalculable advantage by increasing the facilities of communication; it has promoted the agricultural and commercial interests of the community, in some instances more than quadrupled the value of real estate, and laid the foundation of future prosperity and independence.

If these are worthy objects of ambition to a new country like Canada, they should be upheld by the unanimous voice of the Province; if not, let us retrograde to our log shanties, corduroy roads and antiquated conveyances. By way of contrast, I would mention that the journey between Toronto and Cobourg which was formally warranted to be "through by day light," a distance of 75 miles, occupied 24 hours in its accomplishment, under difficulties of no ordinary description; to this I can personally testify having "gone through by daylight" by mail, and duly arrived next morning about the same time at which we started the previous morning. This occurred in the Autumn of 1847; last Autumn I traveled to Cobourg and returned the same day in seven hours, having seven hours to spare for the transaction of business, and went "through by day light" in reality, not by fiction.

The immense traffic on the Great Western Railway during the Autumn of 1856 [last year can hardly be considered even an average by which this travel can be estimated], would impress a careful observer with some idea of the extent of the western trade. This railway was also constructed as an additional avenue, and its success as a profitable speculation is undoubted, and its advantages fully admitted by the stockholders. Several other lines are projected to pass through Canada, as competitors with this above mentioned railways, and on the south shore of Lake Erie, in connection with the Michigan Central Railway, also commands a large share of western traffic. These remarks may be considered foreign to the subject, but in every instance they are forcible illustrations of the magnitude of the western trade. It is needless here to refer to the extent and prospective increase of this trade; it is well understood and appreciated by those who are interested in its developements; it will be considered sufficient to remark, and it is not unreasonable to suppose, judging by the past, that before the Toronto and Georgian Bay Canal can be constructed, the trade of the west may demand a superior capacity of locks, and greater facilities than those at present contemplated. The retention of

the trade of the west by the Erie Canal, notwithstanding the continual expenditure and additional facilities annually afforded by the St Lawrence route, is forcibly commented on by the Hon John Young in his letter to the Hon F Lemieux, Chief Commissioner of Public Works. He states

"It would be easy to multiply facts to establish the same general results; but the figures above given will sufficiently show that which we can neither deny nor controvert, namely, *that the trade in the lower St Lawrence, in the produce of the West, is paltry and insignificant compared with what it ought to be, and compared with that by the Erie Canal*; that our present facilities for transporting property are wholly inadequate to secure successful competition with the more southern route. It is in vain to overlook or undervalue the result; it is forced upon us every year more and more plainly, and was foreseen by every intelligent merchant acquainted with the Western business, and is corroborated by other facts."

In the latter part of 1855, the route by the Ottawa was procured as a panacea for this sickly trade, after the proceedings in Toronto had become public. Lake Nipissing, the proposed feeder of the Ottawa Canal, being two degrees further north than the northern terminus of the Toronto and Georgian Bay Canal, the period of traffic each season of navigation on the Ottawa route would be diminished at least 14 days in the spring and autumn, or one month on an average; and to this may be added the inconveniences of a close navigation for 430 miles, between Lake Huron and the St. Lawrence, as contrasted with 77 miles by this route. For these reasons, and a want of sufficient data in other respects, a comparison may be excused. The terminus of the Ottawa route on Lake Huron will be too far north to compete with the Erie Canal, and, on the contrary, the Welland Canal is too far south. The Toronto and Georgian Bay Canal, being in a direct line between the direct points of traffic, namely, New York on the south east, and the juncture of the three lakes, Superior, Michigan and Huron, on the north west, would, if constructed, possess superior advantages in this respect. In the "Prize Essay" on Canada, written by J S Hogan, Esq., M. P P for the county of Grey, the comparison between the facilities of the St. Lawrence and Erie Canal routes is so clearly described that it is thought advisable to copy it in full, by permission

"Measuring the St. Lawrence, then, as a highway to the ocean, by the standard that if it can be superseded by more rapid, cheaper, or more convenient routes, it cannot be successful. If it does not fall into disuse, what are its future prospects?

"The first thing that strikes one, in contemplating it, is its adaptation, in point of immensity, to the vast regions it waters. Whilst the business necessities of the West, and those portions of America which are universally admitted to be, both by their relative position to other rivers and to it, its natural feeders, have literally shamed the enterprises that were intended to provide for them, its vast magnitude and its value are being but discovered by the contrast. The Erie Canal, highly valuable as a work, and successful beyond comparison, *has been made little by progress*.

"The St. Lawrence, on the contrary, only requires enormous use to test its greatness. It is impossible, indeed, to contemplate this river, in connection with the canal that was made to rival it, without being struck with the inadequacy of the one and the amplitude of the other.

"The valleys and plains watered by the St. Lawrence, being largely in the United States, have chiefly contributed to the Erie Canal's business. Their fruits were literally wooed away from their natural channel to minister to its prosperity. The St. Lawrence, in so far as American policy, and great restrictions upon commerce, could affect it, has been sacrificed to the Erie Canal. Nature's outlet had navigation laws, which drove commerce away from it, to contend against. The Erie Canal had all those disadvantages to the river converted into advantages in its favor. Yet the laws of progress, which have swept away the obnoxious navigation restrictions, have, at the same time, established the failure of the Erie Canal. Not that it is unprosperous as an enterprise, nor that, *as a local work*, it is not unsurpassed as a speculation, but that, for the great purposes of its construction, namely, to convey to the ocean the fruits and productions of the West and North west, it is emphatically a failure, *because progress has completely overburthened it, it is literally surfeited by its own prosperity*. And it matters not to him—an individual, in such a case, being the nation—who has hoards or flour to send eastward by it, whether they are stopped by reason of starvation, or because of a surfeit. The impediment to his business is the all important question with him. And though the Erie Canal paid

larger profits than any other work in the world, yet, in a national point of view, if it afforded not adequate facilities for business, or stopped it in its course, it might, by drawing to it what it could not do, be the means of wide spread evil, instead of general good. And that this is, to a great extent, the present position of the Erie Canal, is universally admitted.

"To obviate these difficulties, enterprise has again undertaken to swell its dimensions to meet the enormous demands of *progress*. But in view of the vast regions which are common alike to it and the St. Lawrence, and which are as yet but in the infancy of their population and business, is it not probable, nay, is it not certain, judging by the past, that twenty years hence will find the Erie Canal again choked up with business—again *made little by progress?* When the magnificent tracts of country embraced in Michigan, Wisconsin, the northern portion of Ohio and Indiana, Illinois, Iowa, Minnesota, and the west and north west portions of the State of New York, which now wholly or largely use the Erie Canal as a highway to the ocean, come to be settled up, and to have, instead of some five or six millions of inhabitants, at least eighteen or twenty, what *mere canal*, with its hundred locks, and its hundred other impediments, will be equal to their vast business necessities? will be in keeping with their splendid progress? will satisfy their craving for rapidity, magnitude and commercial convenience? Will not the Erie Canal *then*, enlarged though it be, be but another added to the numerous examples, in America, *of progress utterly distancing enterprise, and prosperity shaming the calculations even of talent*"

Are any further arguments necessary, after the above almost prophetic demand for an additional and enlarged avenue for Western trade, which cannot be surfeited by progress?

As a demand for improving and developing the mighty resources of these inland seas, the above arguments are not only unanswerable, but, on reflection, will be admitted to be incontrovertible.

Before concluding this Report, I would select this as the most fitting opportunity of thanking A. M. Ross, Esq., George Tait, and Walter Shanly, Esq., Civil Engineer, connected with the Grand Trunk Railway, for important statistical data and other information, Thomas Rideut and S. Fleming, Esqrs., Engineers of the Great Western and O. S. and H. Railways, for the use of plans; also to E. P. Rubidge, Esq., of the Board of Public Works,

and Thomas Devine, Esq., of the Crown Lands Department, for the valuable information afforded by them, thereby facilitating my professional labors, and placing reliable data within reach, which could not otherwise be procured without incurring further labor and loss of time, and entailing additional expense

I have the honor to remain

Your obedient servant,

KIVAS TULLY.

THOMAS CLARKSON, ESQ.,
President of the Board of Trade,
Toronto.

APPENDIX A.

LETTER FROM R. A. ROYS, ESQ.

"In regard to any prospective advantage for freight I think you might mention the immense quantity of pine timber on the north shore of Lake Huron. Already large locations have been taken up, and extensive mills will be immediately erected. The description of mills about to be erected will make 30,000 feet per day, which, for each mill, will make 18,500 tons per annum, allowing one and a half tons per M., which is low. There will soon be about ten of these mills in operation, making annually 185 000 tons of freight and with such encouragement as direct shipping to Liverpool, the West Indies, etc., the sawed pine of Lake Huron alone would employ 500 000 tons of shipping annually. Besides this freight of sawed lumber there are the vast white oak tracts. It costs, at present, about $300 per thousand feet to take square white oak from the north of Lake Huron to Quebec, which is virtually a prohibition! whereas, could it be shipped direct, one quarter of that sum would pay the extra transport making an enhanced value for the timber on Lake Huron of two hundred per cent.

"With such a prospect, the amount of timber that would be manufactured can scarcely be calculated. But I should say that Canada alone, on Lake Huron, would require at least one thousand vessels, of one thousand tons each to carry off her manufactures of sawed pine, square pine, both red and white, pine masts and spars, square oak timber, etc., etc. Besides, what a trade would immediately spring up in ship building. What better place could be selected for this purpose than the proposed outlet of the canal on Lake Huron (Nottawasaga river). At the mouth of the river is a deep reach of three and a half miles long, where one hundred or two hundred of the largest class of ships might be built at one and the same time, and, when built and afloat, they could be in perfect security.

"The timber for manufacturing these, both white oak, white and red pine timber, spars and masts can be cut up the rivers where there are some thousands of acres of these timbers, of the finest quality, which can be floated down to the ship yards with the greatest ease.

"Besides this is only a small item in the prospect for freight. The great west is the country from which the bulk of freight must come. When we see what the making Lake Huron a part and parcel of the Atlantic is going to do, in the way of freight, what must we expect from Lake Michigan, and that great and almost unexplored inland sea, Lake Superior?

"The impetus that the ship canal would give to the timber, mineral fish and grain manufactories, would be incalculable. It would be the opening up to commerce of a new world, already teeming with life, and ready to manufacture to any amount, so long as there is a demand, as the supply of the above named articles, namely, timber mineral, fish and grain, and of the best description, being practicably inexhaustible."

APPENDIX B.

THE TORONTO AND GEORGIAN BAY CANAL

Toronto January 20th, 1858

DEAR DOCTOR!

As the Report on the Toronto and Georgian Bay Ship Canal will soon be published, I would feel obliged by your stating any particulars with which you may be acquainted in reference to the same, for the purpose of publication being assured that for several years you have taken an active interest in its promotion, as its original projector

Believe me to remain, yours very truly,

KIVAS TULLY.

WM. REES, Esq., M.D., *Toronto.*

Toronto, January 21, 1858.

DEAR SIR—

In reply to your note, desiring any particulars I may possess with reference to the Georgian Bay Canal, I have only to state, after having perused your valuable report together with the opinion of Col Mason Gen. Evans of the highest authorities in the United States, that anything I could communicate must be of very little value. I may however observe that having made several explorations subsequent to calling public attention to the project through the columns of the *Courier* in 1832 that I feel the more convinced of its practicability, whilst the rapid strides since made, both in Canada and the western States, has, I conceive, fully proved the justice of my numerous and very urgent appeals to government on that occasion, not merely with reference to the above, but also as to the claims of other important parts of the country to examination, in the direction of the Trent,* Ottawa, and Bay of Fundy, with views to perfecting the St. Lawrence navigation from our vast inland seas to the Atlantic, also, to affording greater encouragement to emigration and settlement, for it must be admitted that the fertile shores of Lake Huron and the rich valleys of the Ottawa and St. Maurice, have been judiciously laid out at the

* On this suggestion of mine Sir John Colborne did cause an examination of the chain of lakes between Lake Simcoe the Trent and Rideau connecting with the Ottawa, which resulted in the construction of certain locks, dams and other partial improvements

period referred to, our population, commerce and revenue, might have been nearly double what they are at present, and it cannot be denied that, on the settlement of the waste lands, the improvement of the St. Lawrence together with the sea ports of Quebec and Montreal, mainly depend the future advancement and prosperity of this country *

That our internal navigation will never be perfect or commensurate with the requirements indicated by the progress of the last few years and that it is merely a question of time (however absurd the idea may appear), when both the Georgian Bay and the Ottawa Canals shall be constructed, must be seems on later acknowledged By the former, vessels descending would have the advantage of the lake navigation most prevailing winds and currents to lide water below Montreal, where they would arrive in the time at present occupied in reaching Buffalo. By the latter, or Ottawa canal, up ward bound vessels would have the benefit of an inland, unobstructed, and more direct route to the head of the Georgian Bay, whilst in the lower St. Lawrence a further improvement may be effected in the saving of from 500 to 600 miles, by means of a short canal at the head of the Bay of Fundy, thus throwing upon the entire American and Colonial seaboard, and perhaps, at the same time, supplying the advantages contemplated by the proposed Champlain route, Chicago and other ports at the head of Lake Michigan and Lake Superior being thenceforth freed to the commercial world

To the St. Lawrence as the natural outlet of the great lakes and the regions west belongs the trade is universally admitted that with the advantage of being one-fourth the distance nearer Europe, together with the facilities presented for its improvement, the trade cannot longer continue to take the more southern channels, than until the above improvement shall have been effected, must be equally evident.†

Persevere then with the light heart and self reliance of a Canadian voyageur who knows no obstacle persevere in the great enterprise and success is certain. The hope, the majesty of Canada is in her highways as the basis of her national wealth, as in her agriculture, her domestic industry and her commerce

Bold comprehensive and enlightened legislators, consonant with the spirit of the age and in which the sister provinces‡ (whose union with the Canadas cannot long be protracted), should be invited to coöperate, is imperatively demanded.

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* A Victoria, or extensive floating dock has become as essential at Montreal as the Victoria Bridge, whilst the filling up and destruction of that noble harbor, once the pride of Quebec should at once be prohibited substituting as a ballast ground through the medium of lighters the river St. Charles a simple means of facilitating at the same time the extension, north-easterly of the limits (long a desideratum) to that important city

† It having been ascertained that the finest and most approved quarries exist on certain islands in the vicinity or immediately on the line of the proposed canal, it may appear worthy of consideration how far—under such advantages, as in most parts of Europe, convict labor may not be employed

‡ In connection with the above the Halifax and St. Johns Inter colonial Railway both of which must sooner or later be constructed deserve attention and it would be well if the Governor of New Brunswick at once sought the possession of the land lying north of the St. Johns River by *purchase*, which was an unjustly ceded by the Ashburton treaty a small angular piece of territory of no great value or importance to the United States, but absolutely indispensable to the construction of a St. Johns and Quebec Railway *If properly* represented to the United States government,

This vast and important appendage to the British Crown, possessed of the most promising destinies, in the enjoyment of every institution essential to intellectual and social development, with one of the most practical forms of government that has ever existed protected and fostered by the most widely extended and powerful empire the world has ever seen should fill every heart with exultation and pride, and prove the most powerful incentive to energetic action, enterprise and emulation *

I am truly yours,

WM. REES.

KIVAS TULLY, Esq.,
Chief Eng'r Toronto & G. B. Canal,
Toronto.

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considering the very great concessions made by Lord Amherst in both the settlement of the north western boundary as well as in the settlement at the north-eastern boundary no doubt but that it could be *purchased* at a fair valuation Almost of equal importance to Canada is that also comprised between the St Louis and Red rivers at the head of Lake Superior

* As indications of progress the population of the North-west is already set down at 10,000 000, the city at Chicago 120,000 One mill in products yielded in slaughtered cattle alone during the last year $8,000,000 and grain from all parts in proportion. Lake fisheries 80 to 100 000 barrels Whilst these are no less than three Pacific railways projected showing that the great European highway in a price worth contending for $3,000,000 with as many acres of land and the labor of 5,000 convicts, would accomplish the work in five years And it may be desirable at once to reserve for the benefit of such undertaking that amount of the Crown lands throughout the line Nor should it be further time be lost by the government. Surveys and roads throughout the whole of that intersecting part of the country should be made Harbors and emigration depots should be provided and thereby a more generally enlightened and liberal policy Ought we not to be allowed an opportunity of redeeming ourselves from the stigma of a late Lieutenant-Governor at that time somewhat merited namely that our population was not that of the parish of Mary le Bone our revenue not that of an English Commoner our boasted canals and harbors misplaced and but public patchwork, our enterprise and prosperity likened to a girdled tree; whilst the Westminster *Review* characterized the whole country as a wilderness. Thanks however to the establishment of a Provincial Board of Works and perhaps to the precautionary of such a cohake our general progress and our national works so munificently endowed will at the present period well compare with those of the most favored of other countries, whilst our great natural and commercial advantages press superior to any on the whole of this continent Then let our Provincial representatives be made sensible, that the greater interests of the country lie a little beyond their own doors at the more frontier line of settlement, and the real and material source of wealth invested in be developed and are to be mainly sought in opening up, utilizing the internal, great thoroughfares not called above and which will be found as picturesque and fertile as the valleys of the Hudson and Mohawk which it surpasses in the extent and magnitude of its water power To succeed however in securing the confidence of capitalists, and attracting respectable emigrants to our views, the great moral interests must not be overlooked Sectional jealousies and asperities, party feuds and party processions are as inimical to the peace and prosperity of a new country as they are degrading to the whole community and should by an appeal to the good sense, pride and patriotism of the people, be by mutual consent forever extinguished The more comprehensive designs of a union with our maritime provinces, the Inter-colonial Railway and Ocean Mail service, when resolved in connection with our accessions to the North western territory and the various American projected railway routes to the Pacific cannot fail to command by analogous illustrations of the Imperial Government in what has long been foreshadowed the establishing at no distant period of a regular Pacific portage and it would be an enterprise worthy the Hudson's Bay Company as considering their deep interest and intimate knowledge of that highly interesting country, at once to plan and as the early bringer of the rich Saskatchewan, the foundation of a *great central city* of the North-west which would doubtless be followed by a great military or governmental high road

APPENDIX C.

Meteorological Mean Results at the Toronto Observatory.

MONTH.	Mean Barometer.	TEMPERATURE.				THERMO. TEMPERATURE.		RAIN.		SNOW.		WIND.			
	Mean.	Max.	Min.	Range.	Mean of 17 years.	Mean of 17 years.	Thermo. Above Sky.	Mean of 17 years.	Days.	Inches.	Mean of 17 years.	Inches.	Total mean Velocity in miles.	Resultant of 9 years.	Mean Velocity.
	deg. m	deg. m	deg. m	deg. m	deg. m	deg. m	deg. m	in.			in.				Miles.
January	29.4696	33 84	6 52	27 32	19 87	32 9	12 97	2 606	16	6	10 6	24	2 280	N 72W	6 68
February	29.4695	33 91	6 69	27 22	20 21	33 1	12 91	1 525	13	5	10 6	20	2 190	N 55W	6 33
March	29.5614	39 56	21 69	17 87	29 72	40 1	10 43	2 520	15	8	13 10	32	2 274	N 35W	6 32
April	29.5603	51 65	29 74	21 91	39 69	50 3	10 33	2 554	15	6	3	15	2 274	N 35W	5 99
May	29.5603	61 83	37 62	24 21	49 72	60 2	12 10	3 554	15	6	0	0	2 274	N 35W	5 99
June	29.5613	71 41	46 49	24 92	58 95	69 7	12 46	3 551	15	1	0	0	2 274	N 35W	5 99
July	29.5613	75 84	52 54	23 30	64 7	74 2	11 60	3 551	15	0	0	0	2 274	N 35W	5 99
August	29.6361	73 66	51 49	22 17	62 85	72 5	9 75	3 547	14	0	0	0	2 267	N 35W	5 90
September	29.6041	64 94	41 76	23 18	53 35	63 1	9 77	3 495	14	1 9	1 9	4	2 199	N 35W	5 80
October	29.6361	55 84	34 14	21 70	45 99	56 0	9 86	3 495	14	10 7	10 7	21	2 199	N 35W	5 80
November	29.6188	46 50	24 54	21 96	35 52	46 5	10 98	2 495	14	14 4	14 4	29	2 199	N 35W	5 80
December	29.6405	36 03	14 50	21 53	25 26	36 0	10 74	2 495	14	9 1	9 1	18	2 199	N 35W	5 80
Mean etc	29.5899	44 15	July 75 84	64 53	31 0	45 0	11 00	2 495	180	79	81 1	164	25 960	—	6 19
DATA	Mean of 18 years.	Mean of 17 years.	Mean of 17 years.	Mean of 17 years.	Mean of 17 years.	Mean of 17 years.	Mean of 17 years.	Mean of 17 years.	Mean of 17 years.	Mean of 17 years.	Mean of 17 years.	Mean of 17 years.	Mean of 17 years.	Resultant of 9 years.	Mean of 9 years.
															Mean of 7 years.

APPENDIX D.

GEOLOGICAL DESCRIPTION

By reference to Sir William Logan's map, illustrating the physical structure of the Western District of Upper Canada, it will be observed that the proposed canal, commencing at the Humber Bay situated in the Hudson River group, crosses the line of division between this and the Utica slate about twenty three miles from Lake Ontario and the line of division of the Trenton limestone, thirty-three miles from Lake Ontario, comprising the 'Ridges' in King. Route No. 1 continues in the group to the mouth of the Nottawasaga River.

The whole of the proposed routes pass through the lower silurian formation, except fifteen miles of the northern portion of route No. 2 which crosses the line of division between the lower silurian and Laurentian terrace of the Geological survey.

Route No. 3 would also commence in the Hudson river group crossing the lines of division of the Utica slate and Trenton groups forty and fifty miles from Lake Ontario respectively and continuing in the latter group to the mouth of the Nottawasaga River.

In Sir William Logan's paper on the physical structure of the Western District, etc., published in the August number [1854] of the Canadian Journal, the position which refers to this locality is as follows:

"Taking these rocks in the general groupings, it will be perceived by the map that the lower silurian series, by a change in the strike from west to north west, sweeps round from Lake Ontario to the Georgian Bay, and proceeds thence by the north side of the Manitaulin Islands, and the north shore of Lake Huron to the northern peninsula of Michigan, gradually curving to Green Bay in Lake Michigan. The upper silurian follows them. The Niagara limestone at the base side in forming the neck of land separating and holding up Lake Erie and Lake Ontario, and continues in a ridge along the Blue Mountains, and the promontory terminating at Cabots Head and Cape Hurd of which promontory the chain of the Manitaulin Islands is only an interrupted prolongation."

The Hudson river group is exposed in front of the new garrison, west of Toronto, during the lowest lake level, and can be distinctly traced along the banks of the river Humber as far as Berwick on the south side of the ridges, a distance of fourteen miles, indicating an inclination of about twenty feet to the mile in this direction, on the north side of the ridges no trace of the group has been discovered along the line of survey.

On Lot 24 in the 9th lon of Albion township a limestone crops out, which from good authority is stated to be a portion of the Trenton group. If this is the case the line of division between this group and the Utica slate should be drawn eight miles further west than is indicated on the geological map, and the whole of the deep excavation in the township of King would be in the Trenton group.

As the Trenton limestone, where it crops out on the river St. Lawrence, is proved to be very suitable for building purposes, the locks on the St. Lawrence canals having been constructed with this material, the work on the excavation will be considerably lessened in quantity and as the limestone can be used in the construction of the locks, a considerable saving in the cost would be effected.

In connection with this question the following description of the subsidence of "drift" period in Sir Charles Lyell's Manual of Geology, page 135, will be interesting to the advocates of this important undertaking:

From the distinct evidence of drift on the surface of the ridges, corresponding with Sir Charles Lyell's description there can be no doubt but that the upper portion of the deep excavation will be through the "drift" described on the Trenton group thereby reducing the *inseperable* difficulties to those of time and money.

"By the hypothesis of such a slow and gradual subsidence of the land we may account for the fact that almost everywhere in North America and Northern Europe, the boulder formation rests in a polished and furrowed surface of rock, a fact by no means obliging us to imagine, as some think that the polishing and grooving action was as a whole, anterior in date to the transportation of the erratics.

"During the successive depressions of the highland varying originally in height from 1000 to 3000 feet above the sea level, every portion of the surface would be brought down by turns to the level of the ocean, so as to be converted first into a coast line and then into a shoal, and at length after being well scored by the stranding upon it of thousands of icebergs might be sunk to a depth of several hundred fathoms.

"By the constant depression of land the coast would recede further and further from the successively formed zones of polished and streaked rock, each outer zone becoming in its turn so deep under water as to be no longer grated upon by the heaviest icebergs. Such sunken areas would then simply serve as receptacles of mud, sand and boulders dropped from melting icebergs up to a depth scarcely, if at all inhabited by urinacea and zoophytes. Meanwhile, during the formation of the unstratified and unfossiliferous mass in deeper water the smoothing and furrowing of shoals and breaches is still going on elsewhere, upon and near the coast in full activity.

"If at length the subsidence should cease, and the direction of the movement of the earth's crust be reversed, the sunken area covered with drift would be slowly reconverted into land.

The boulder deposit before emerging would then for a time be brought within the action of the waves, tides and currents, so that its upper portion being partially disturbed would have its materials rearranged and stratified. Streams also flowing from the land would in some places throw down layers of sediment upon the till. In that case the order of superposition will be first and uppermost, sand, loam and gravel occasionally fossiliferous. Secondly an unstratified and unfossiliferous mass, for the most part of much older date than the preceding with angular erratics or with boulders interspersed, and Thirdly, beneath the whole, a surface of polished and furrowed rock."

APPENDIX E.

Magnitude of the Lakes, from Desturnell's Trip Through the Lakes.

NAME.	Area.	Length in miles.	Greatest Breadth	Average Breadth	Coast Line	Depth, in feet.	Elevation above the Sea.	REMARKS.
Superior	32 000	420	160	80	1090	1000	600	The Sault Ste Marie Canal connects Lakes Superior and Huron Size of the locks, 350 feet long 70 feet wide 10 feet 6in. Canal one mile in length.
Huron	22,000	240	110	70	705	900	574	
Michigan	21 200	280	83	58	365	300	578	
Erie	11,900	250	80	35	570	204	564	Welland canal connects Lakes Erie and Ontario; 26 miles in length
Ontario	6,200	180	58	40	410	600	234	High water 5 feet above lowest level.
Georgian Bay	6 000	140	55	40	310	900	574	" " 4 " " "
Simcoe	564	35	18	16	108	120	704	" " 2 " " "
St. Clair	392	20	25	15	80	3 to 20	588	Annual loss at the Flats, $1 000,000, besides detention six days each trip
Champlain	1 130	120	12	10	240	54 to 282	90	Chambly and Champlain canals connect the St Lawrence and Hudson. Twelve miles and 66 miles long, respectively
Green Bay	1,900	100	25	18	220	100	475	
Nipissing	550	40	18	12	120	unknown.	643	

NOTE.—From Arkeesti Island to Fond du Lac, Lake Superior ..... 2,806 miles.
Coast line of the River St Lawrence and Lakes ..... 3 687 "
Navigable tributaries of the St Lawrence ..... 500 "

NOTTAW

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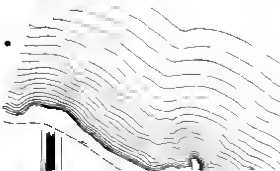


THUNDER B.

TINY

WASAGA

BAY

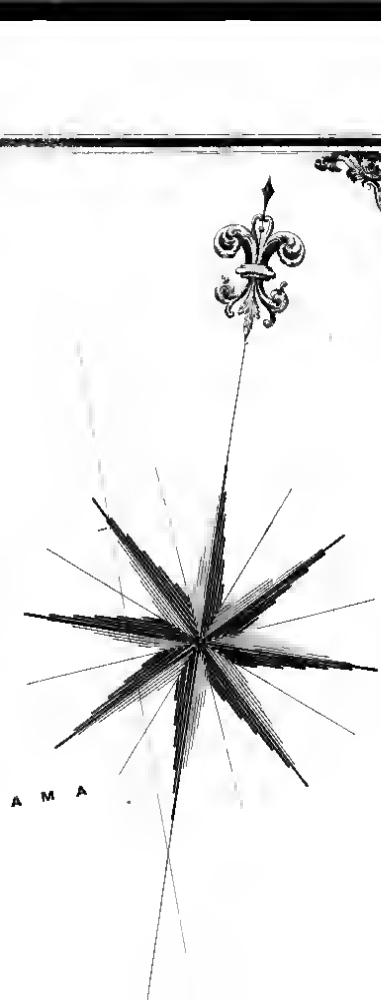
Sandy Shore

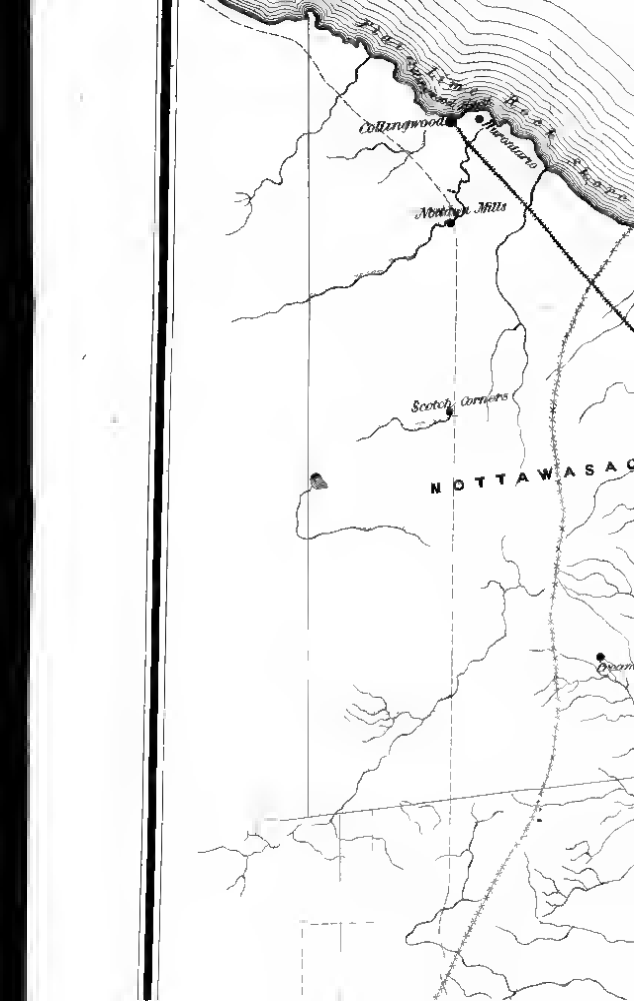
Nottawasaga R.

GLOUCESTER BAY
Penetanguishene Road
Garrison
Penetanguishene
Fort
Bay
Point
Penetanguishene Point
Gloucester Point
Beacon
Church
Methodist
Meeting House
Methodist
Meeting House

RIVER SEVERN
MATCHEDASH
Route No 2
ORILLIA
Coldwater Road

RAMA

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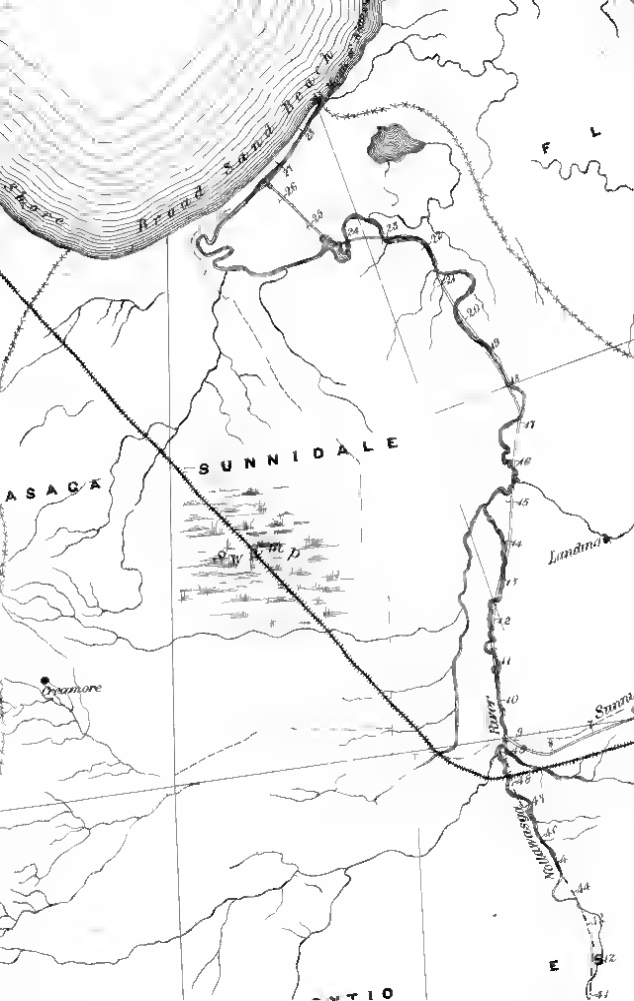
Nottawa Mills
Scotch Corners
NOTTAWASAG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ASAGA
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Creamore
Nottawasaga River
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Barrie
Kempenfeldt
KEMPENFELDT BAY
Sunnidale
INNISFIL

Bass Lake
Orillia
ORILLIA
SOUTH
Athenlig
Ridge Road
LAKE
SIMCO
BAY
Big Bay Point
Spoke
Hillsdale Pt.
Hillsdale Point
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Beaverton

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MARA
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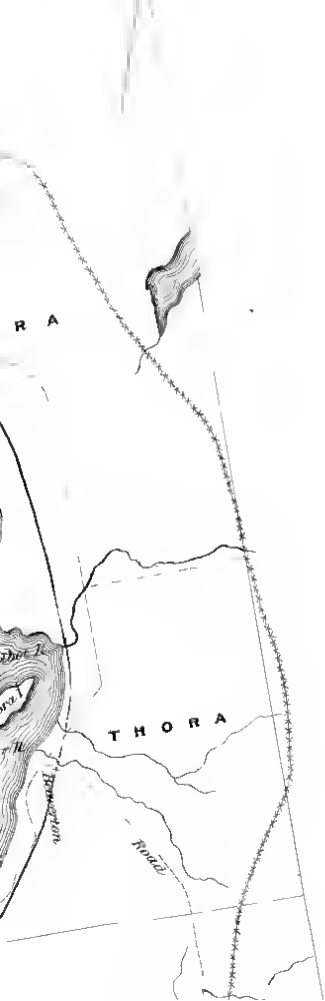
Thora R.
THORA
Bacuna
GEORGINA ISLAND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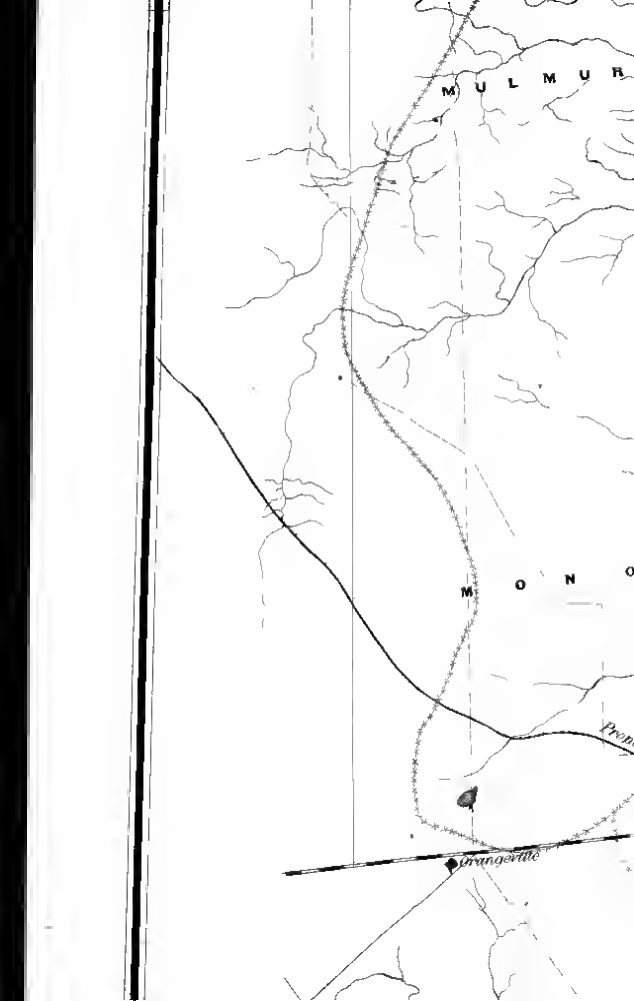
Brewerton
Rowley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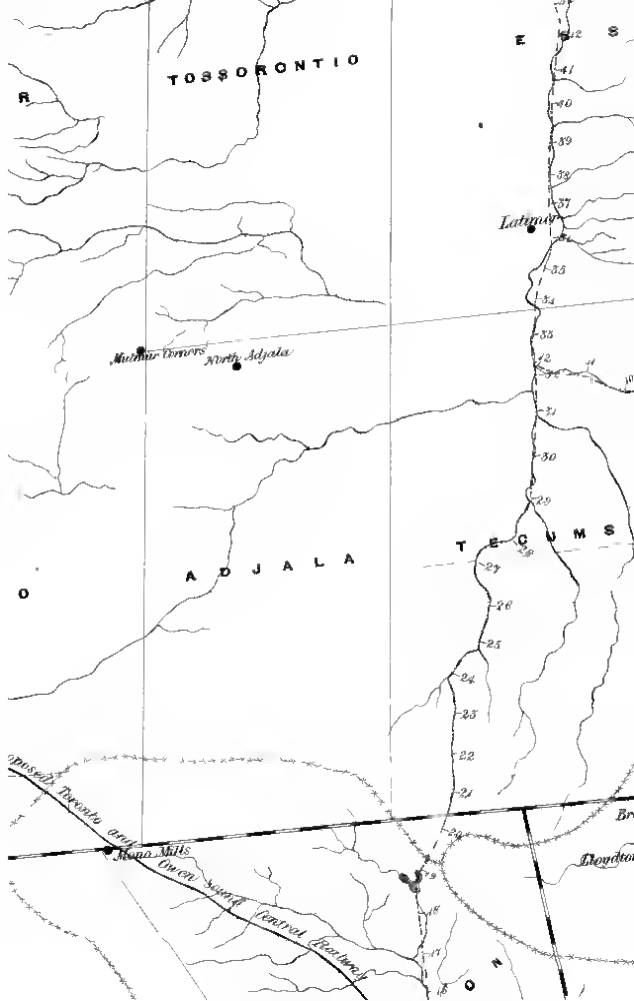
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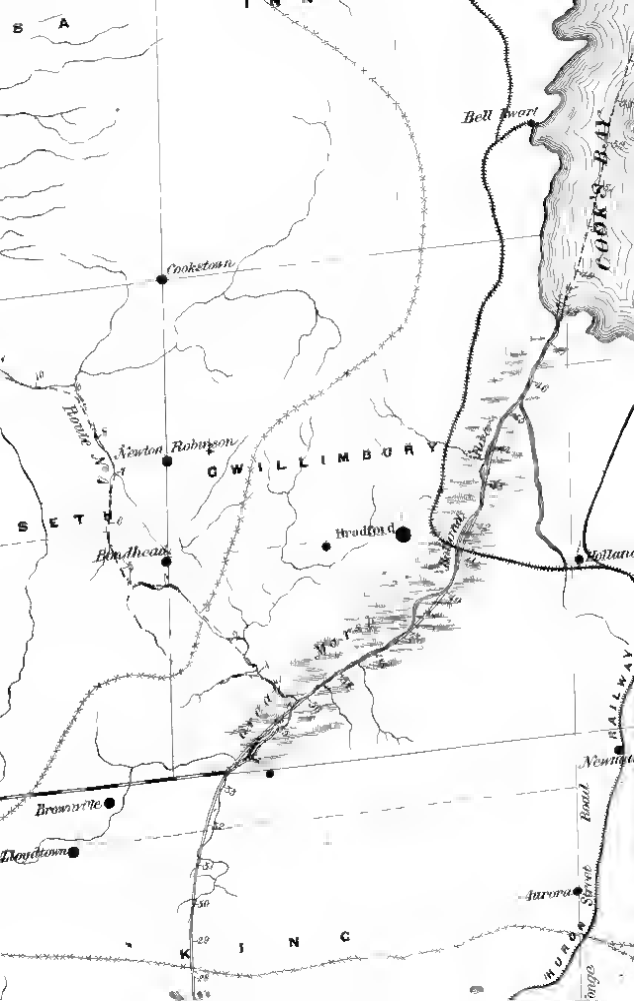
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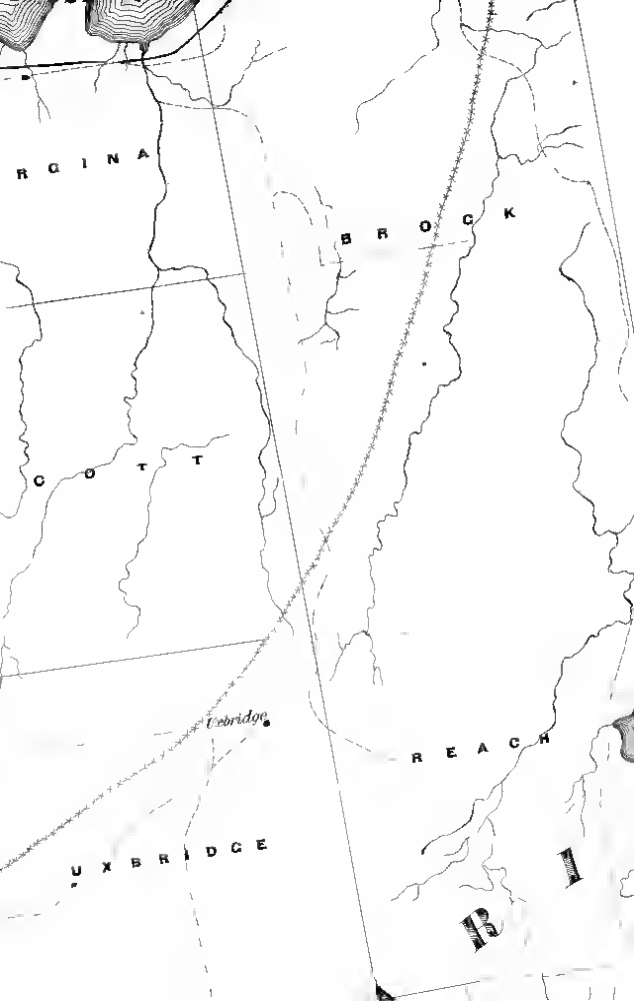
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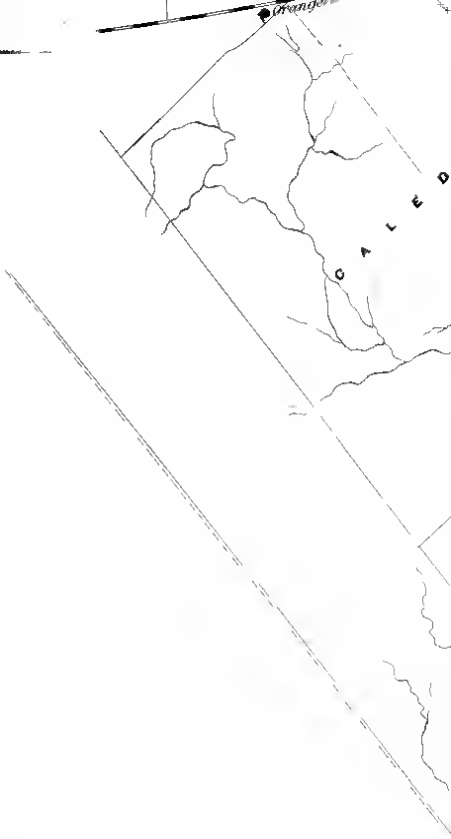

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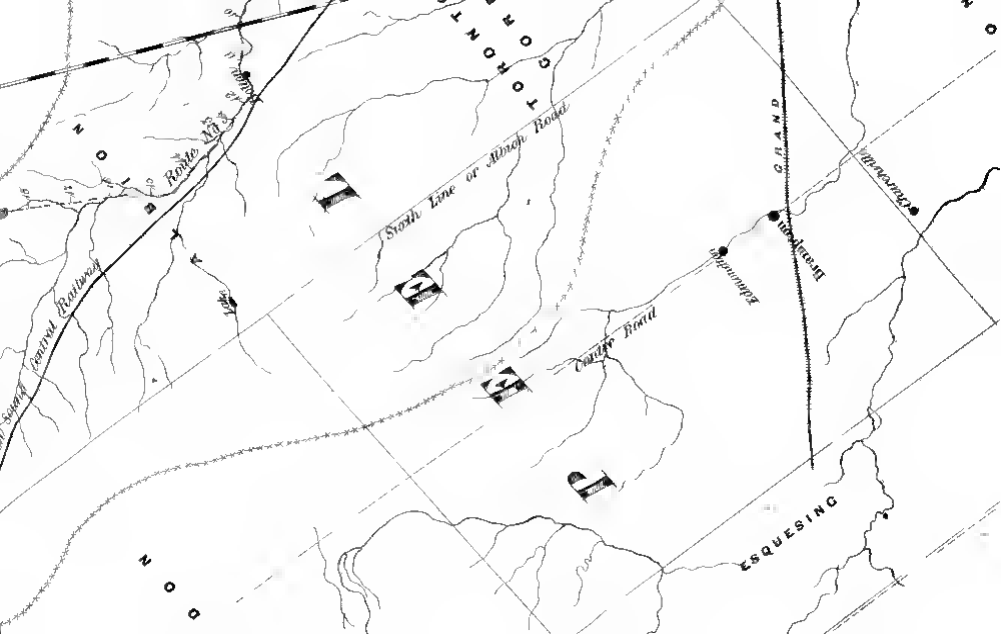
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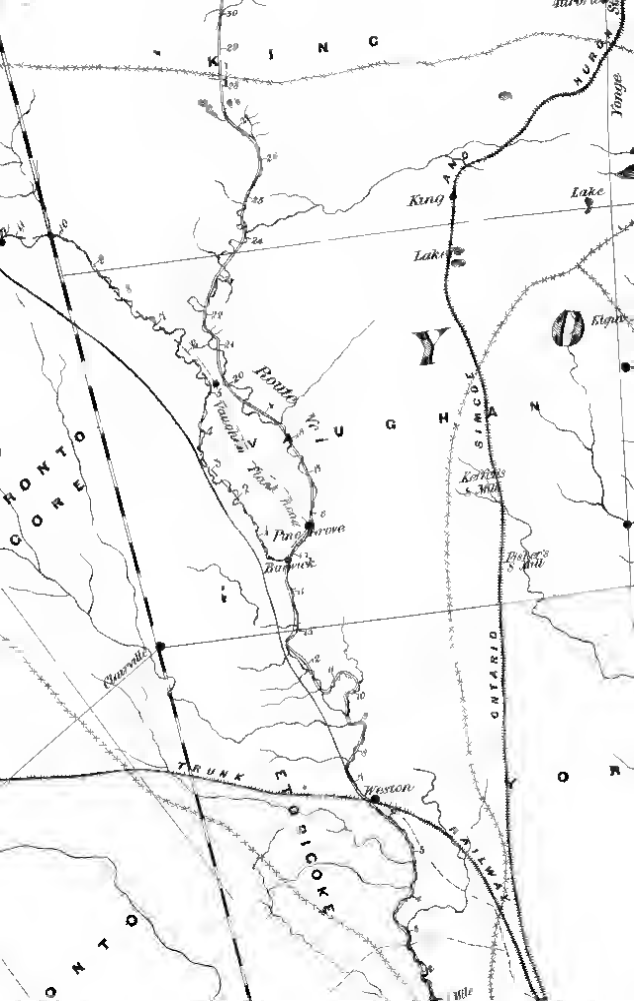
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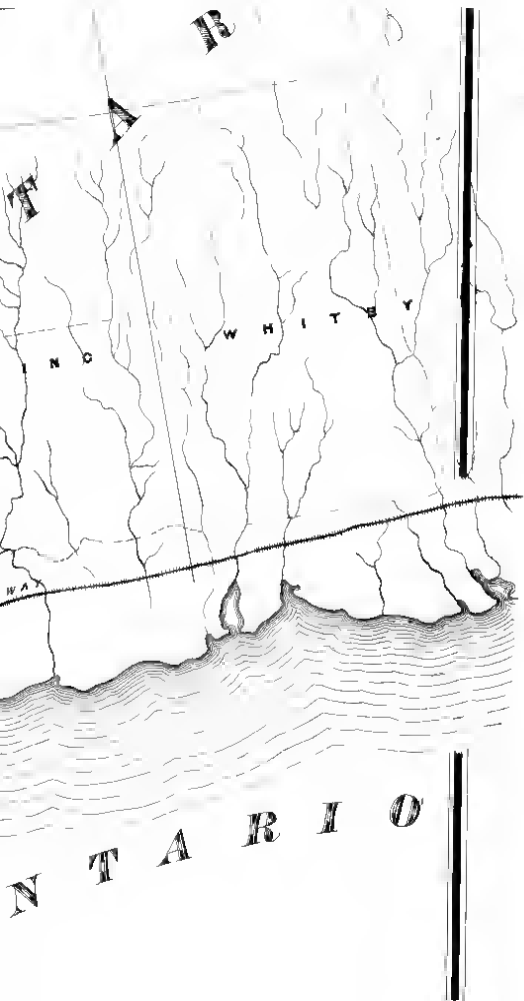
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	CANAL	LAKE
Length of Route N° 1	77 miles	23 miles
" " " " 2	65	33 "
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" " " " 4	84	

Lake Simcoe Water Shed 1200 Square miles
Nottawasaga River " 1000 " "
Humber " — 500 " "
Don " 125 " "

Water Supply from Lake Simcoe 60 000 C^ft per Mi
" " " required for the Canal 12 000 " "

Lines of Water Shed Marked thus x-x-x-x-x-x
Railways in Operation " —
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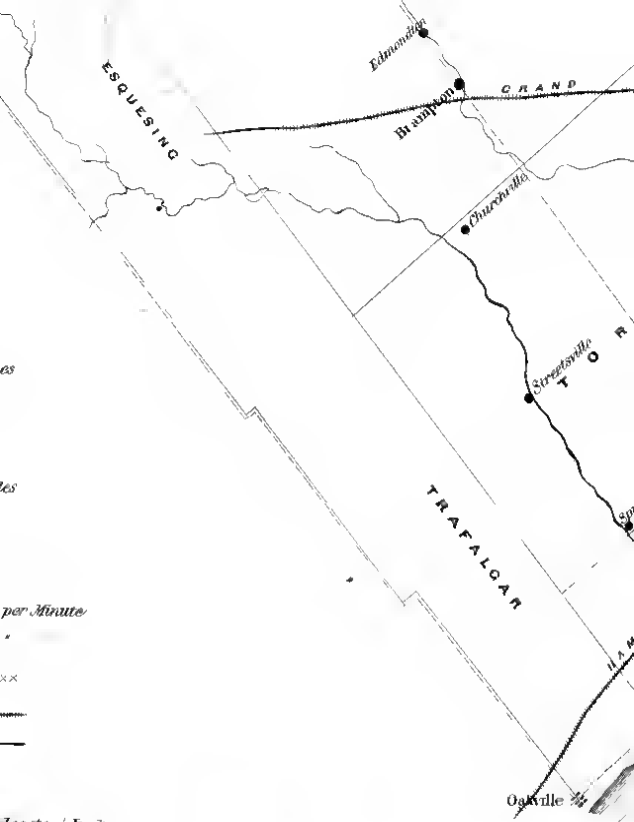
Scale 2½ Miles to



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Civil Engineer

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MAP

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OF THE

NTO & GEORGIAN BAY

E.I.P CANAL

Between the

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ULLY, C E TORONTO
ef Engineer

R B MASON C. E CHICAGO
Consulting Engineer

N T A R I O

Proposed Routes

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& LAKE HURON.

R. B. MASON C. E. CHICAGO
Consulting Engineer

Springer Nature

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BELL SYSTEM

	Operating revenues	Operating expenses	Net operating income	Net income
1970—Total	$24,010,000,000	$19,010,000,000	$4,999,000,000	$2,556,000,000
1969	21,519,000,000	17,139,000,000	4,380,000,000	2,350,000,000
Increase	$2,491,000,000	$1,871,000,000	$619,000,000	$206,000,000
Percent	11.6%	10.9%	14.1%	8.8%

Net income per share—1970, $3.06; 1969, $3.01; increase, 1.7%. Number of shareholders—1970, 2,928,000; 1969, 2,779,000; increase, 149,000. Number of employees—1970, 765,000; 1969, 757,000; increase, 8,000. Total payroll—1970, $11,000,000,000; 1969, $10,000,000,000; increase, $1,000,000,000. Average annual employee compensation—1970, $14,379; 1969, $13,210; increase, $1,169.

Telephone Industry Statistics

	1970	1969
Telephones	120,000,000	114,000,000
Calls handled	300,000,000	285,000,000
Miles of wire	500,000,000	475,000,000
Operating revenues	$40,000,000,000	$36,000,000,000
Operating expenses	$32,000,000,000	$29,000,000,000
Net operating income	$8,000,000,000	$7,000,000,000
Net income	$4,000,000,000	$3,800,000,000
Net income per share	$4.80	$4.56
Number of shareholders	3,500,000	3,400,000
Number of employees	1,000,000	980,000
Total payroll	$15,000,000,000	$14,000,000,000
Average annual employee compensation	$15,000	$14,286

The following table shows the number of telephones per 100 persons in the United States and other countries on January 1, 1970:

Country	Telephones per 100 persons
United States	60
Sweden	55
Canada	50
New Zealand	45
Australia	40
Switzerland	35
Denmark	30
Norway	28
Iceland	25
Luxembourg	22
West Germany	20
United Kingdom	18
France	15
Belgium	12
Netherlands	10
Japan	8
Italy	6
Spain	4
Portugal	2
Greece	1

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Chapter Eight Hundred and Seventy-Three

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Email

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Name

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Phone

Email

Medical Information

Allergies

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Medical Conditions

Insurance Provider

Policy Number

Group Number

Primary Care Physician

Phone

Clinic

Consent

I consent to receive medical treatment at this facility.

Signature

Date

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Mr. [redacted]
[redacted]
[redacted]
[redacted]
[redacted]

[redacted]

[redacted]

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Name

Address

Telephone

Date of Birth

Marital Status

Spouse's Name

Spouse's Address

Spouse's Telephone

Spouse's Date of Birth

Children's Names

Children's Addresses

Children's Telephones

Children's Dates of Birth

Employer

Employer's Address

Employer's Telephone

Employer's Business

Spouse's Employer

Spouse's Employer's Address

Spouse's Employer's Telephone

Spouse's Employer's Business

Insurance Agent

Insurance Agent's Address

Insurance Agent's Telephone

Insurance Agent's Business

Attorney

Attorney's Address

Attorney's Telephone

Attorney's Business

Accountant

Accountant's Address

Accountant's Telephone

Accountant's Business

Stockbroker

Stockbroker's Address

Stockbroker's Telephone

Stockbroker's Business

Banker

Banker's Address

Banker's Telephone

Banker's Business

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APPENDIX X

(Mandatory Information)

X1. Specimen Test Certificate

X1.1 The following specimen test certificate is for information purposes only:

Test Certificate

Purchaser

Purchaser's Order No.

Material Specification

Material Description

Quantity

Test Results

Heat Number

Tensile Strength

Yield Strength

Elongation

Reduction of Area

Hardness

Impact Strength

Bend Test

Nondestructive Examination

Remarks

We certify that the material described above has been manufactured, tested, and inspected in accordance with the specification listed above and has been found to meet the requirements thereof.

Date

Authorized Signature

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Chapter

ماده ۱۵

هیچ [illegible] نمی‌تواند [illegible] مگر در مواردی که [illegible] به [illegible] [illegible] [illegible]

Author

Publication info

Abstract

WASAGA
BAY

TORONTO
CITY OF TOR

MAP
TH A GEORGIAN BAY
SHIP CANAL
TORONTO & LAKE HURON

BAY
LAKE HURON